VOLUME I

FINAL REPORT

FEASIBILITY STUDY FOR INSTALLATION OF UMCS FORT RILEY, KANSAS

ENERGY ENGINEERING ANALYSIS PROGRAM (EEAP)

Prepared for

U.S. ARMY CORPS OF ENGINEERS
KANSAS CITY DISTRICT
KANSAS CITY, MISSOURI

Under

U.S. ARMY ENGINEER DISTRICT, MOBILE
INDEFINITE DELIVERY A-E CONTRACT
CONTRACT NO. DACA01-94-D-0033
DELIVERY ORDER NO. 0001

EMC ENGINEERS, INC.

DENVER, COLORADO
ATLANTA, GEORGIA

DEPARTMENT OF THE ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS
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EMC No. 1406-001

December 1995

By

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303/988-2951

This report has been prepared at the request of the client, and the observations, conclusions, and recommendations contained herein constitute the opinions of E M C Engineers, Inc. In preparing this report, EMC has relied on some information supplied by the client, the client's employees, and others which we gratefully acknowledge. Because no warranties were given with this source of information, E M C Engineers, Inc. cannot make certification or give assurances except as explicitly defined in this report.

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LIST OF ABBREVIATIONS

ACC	-	air cooled condenser
ACCU	-	air cooled condensing unit
ACU	-	auxiliary control unit
AHU	-	air handling unit
AI	-	analog input
ANSI	-	American National Standards Institute
AO	-	analog output
BLR	-	boiler
Btu	-	British thermal unit
CDP	-	condensate pump
CH	-	chiller
CNW	-	condenser water
CNWR	-	condenser water return
CNWS	-	condenser water supply
COE	-	Corps of Engineers
COS	-	control operator station
CV	-	converter
CW	-	chilled water
CWP	-	chilled water pump
CWR	-	chilled water return
CWS	-	chilled water supply
EZDOE	-	Computer program used for calculating building hour energy use.
DD	-	dual duct
DDC		direct digital control
DHW	-	domestic hot water
DI	-	digital input
DISC	-	discounted
DO	-	digital output
DOIM	-	Directorate of Information Management
DTM	-	data transmission media
DTW	-	dual temperature water
DTWP	-	dual temperature water pump
DX	-	direct expansion
ECO	-	Energy Conservation Opportunity
EMC	-	E M C Engineers, Inc.

EMCS	-	energy monitoring and control system
F	-	fahrenheit
FC	-	fan coil
FO	-	fiber optic
ft	-	foot, feet
ft^2	-	square feet
gal	-	gallons
gpm	-	gallons per minute
hp	-	horsepower
hr	-	hour
HRU	-	heat recovery unit
HW	-	hot water
HWP	-	hot water pump
HWR	-	hot water return
HWS	-	hot water supply
H&V	-	heating and ventilating
IR	-	infrared radiant
JC	-	Johnson Controls
kW	-	kilowatt, one thousand watts
kWh	-	kilowatt-hours, one thousand watt-hours
lb/hr	-	pounds per hour
LCCA	-	life cycle cost analysis
MAU	-	make-up air unit
MBtu	-	million British thermal units
MZ	-	multizone
O&M	-	operation and maintenance
OA	-	outside air
PC	-	personal computer
psia	-	pounds per square inch absolute
psig	-	pounds per square inch gage
PW	-	Public Works
RA	-	return air
RAD	-	radiation heating system
RAF	-	return air fan
RCU	-	remote control unit
rpm	-	revolutions per minute
SIR	-	Savings-to-Investment Ratio

SOW	-	scope of work
sq ft	-	square foot
STM	-	steam
SVGS	-	savings
SZ	-	single zone
temp.	-	temperature
UCU	-	unitary control unit
UH	-	unit heater
UMCS	-	utility monitoring and control system
VAV	-	variable air volume
VSD	-	variable speed drive
WAC	-	window air conditioner
yr	-	year(s)

EXECUTIVE SUMMARY

OBJECTIVE

The Feasibility Study for Installation of UMCS at Fort Riley was performed as part of the Energy Engineering Analysis Program (EEAP) for the Kansas City District Corps of Engineers. The purpose of this feasibility study is to determine the economic feasibility of replacing the existing UMCS with a Utility Monitoring and Control System (UMCS) and adding additional buildings to the UMCS. The existing pneumatic controls would be replaced with direct digital controls.

PROPOSED UMCS

A total of 214 buildings were analyzed to determine the economic benefits of UMCS monitoring and control. Three alternative UMCS configurations were evaluated in this study at the Interim Submittal. Alternative 1 discussed replacement of the existing JC/85/40 EMCS with a new JC Metasys UMCS via implementing a sole source contract for the UMCS. The evaluation investigated the possibility of a higher contract cost for material and labor due to implementing a sole source contract. Alternative 2 discussed installation of a new UMCS in parallel with the existing JC/85/40 EMCS, thus ending up with two separate control systems for the buildings evaluated. Alternative 3 discussed installation of a new UMCS for the buildings evaluated in the study, replacing the existing JC/85/40 EMCS.

Alternative 1 was evaluated to introduce the potential results of implementing a sole source contract for the UMCS without a competitive bidding environment. Based on the discussion at the Interim Submittal review conference, this alternative was eliminated from the study.

Alternative 2 was evaluated to investigate the possibility of reusing the existing EMCS. The existing EMCS is currently used to its capacity and is ten year old technology. A new UMCS is recommended to provide better and more reliable control, therefore, this alternative was eliminated from the study.

Alternative 3, the installation of a new UMCS, is recommended and the evaluation is presented in this study as the proposed UMCS.

The proposed UMCS would replace the existing JC/85/40 EMCS and include new buildings which are economically feasible on the UMCS. The following items were evaluated:

- Install new front-end computer equipment for new UMCS.
- Install new field panels, UMCS points, and control wiring in the existing 23 buildings and new buildings.

- Install FO DTM to existing and new buildings.
- Install new software and provide programming for the data base and control sequences.

METHODOLOGY

The heating, ventilation, and air-conditioning (HVAC) systems in each of the 214 buildings were analyzed for the appropriate utility management functions and evaluated for energy savings and manpower cost savings associated with these functions. Construction costs were determined for installation of the utility management functions on the HVAC systems. The construction costs and energy savings were summarized for each building and an economic evaluation was performed. The buildings were ranked in order of priority according to the savings-to-investment ratio (SIR) of each building. A project life cycle cost analysis (LCCA) was then performed for the proposed UMCS.

UMCS OPERATIONS AND MAINTENANCE

The existing UMCS at Fort Riley is currently operated and maintained by trained UMCS operators. It is recommended that additional training for the UMCS operators be required to operate and maintain the proposed UMCS. UMCS operators should be familiar with the new UMCS hardware and software and be able to maintain and troubleshoot the new system. Continuing maintenance of UMCS equipment is essential if the maximum benefits of the system are to be realized.

BUILDING SUMMARY

The results of the building-by-building analysis for the proposed UMCS are summarized in Table ES-1, beginning on page ES-3. The building economic summary table ranks the buildings from highest to lowest SIR. Those buildings with SIRs less than 1.25 were summed and reported as non-qualifying buildings. The non-qualifying building totals were subtracted from the totals for all buildings to determine the totals for qualifying buildings.

Table ES-1. Building Economic Summary

6914	EXC MAIN RETL	222	425,289	12,797	29	$76,642	20	24	11	49	104	$21,172	$2,810	$23,982	$710,871	29.64	0.31
0403	ADMIN GEN PURP	0	219,576	664	12	$12,094	6	0	6	4	16	$3,970	$1,034	$5,004	$108,166	21.62	0.41
0500	POST HQ BLDG	0	329,263	2,396	10	$23,711	9	0	11	13	33	$9,065	$1,034	$10,099	$215,523	21.34	0.43
4010	DENTAL CLINIC	70	265,252	2,494	22	$23,545	10	8	9	19	46	$9,507	$1,347	$10,854	$213,857	19.70	0.46
0210	MILIT PERS BLDG	169	879,865	4,208	30	$58,707	14	33	9	59	115	$23,944	$2,947	$26,891	$527,189	19.60	0.46
7285	CLOTHING SALES	38	134,509	3,177	15	$19,969	7	5	5	18	35	$9,017	$1,073	$10,090	$184,815	18.32	0.51
8063	ENL PERS DIN	42	155,912	1,591	8	$14,249	3	9	2	15	29	$6,056	$1,034	$7,090	$129,706	18.29	0.50
7866	THEATER W/DRESS RM	46	166,101	1,678	16	$15,332	8	6	6	15	35	$6,933	$1,210	$8,143	$139,408	17.12	0.53
7832	GYMNASIUM	0	16,566	4,706	8	$20,264	9	7	6	30	52	$10,157	$1,210	$11,367	$192,409	16.93	0.56
7632	GYMNASIUM	0	16,566	4,627	8	$19,940	9	7	6	30	52	$10,157	$1,210	$11,367	$189,327	16.66	0.57
0200	ADMIN GEN PURP	0	290,211	2,111	20	$21,162	12	0	16	14	42	$10,852	$1,269	$12,121	$192,208	15.86	0.57
0808	BN ADMIN & CLRM	42	193,866	467	11	$11,277	3	8	3	11	25	$5,281	$1,052	$6,333	$100,121	15.81	0.56
0802	BN ADMIN & CLRM	42	193,866	467	11	$11,277	3	8	3	11	25	$5,281	$1,052	$6,333	$100,121	15.81	0.56
7024	GYMNASIUM	0	16,566	4,623	8	$19,922	9	7	6	30	52	$10,157	$1,928	$12,085	$189,156	15.65	0.61
0206	ADMIN GEN PURP	50	103,133	1,316	15	$11,303	7	3	6	12	28	$5,371	$1,269	$6,640	$102,897	15.50	0.59
6940	INDOOR SWIM POOL	0	98,409	1,196	7	$9,159	6	2	3	12	23	$4,500	$1,210	$5,710	$84,071	14.72	0.62
0205	CAVALRY MUSEUM	3	141,302	1,221	16	$11,320	4	7	4	16	31	$6,460	$1,269	$7,729	$103,052	13.33	0.68
6620	COMMUN ACT CTR	148	212,488	2,701	19	$24,120	10	16	10	34	70	$14,849	$2,010	$16,859	$219,062	12.99	0.70
0509	ADMIN GEN PURPOSE	0	39,438	370	0	$3,153	1	0	1	2	4	$1,213	$1,034	$2,247	$28,831	12.83	0.71
7665	DENTAL CLINIC	45	131,606	983	13	$10,940	4	8	7	14	33	$7,005	$1,164	$8,169	$98,729	12.09	0.75
0820	TAC EQUIP SHOP	25	144,124	1,030	7	$11,003	7	6	3	21	37	$7,285	$1,052	$8,337	$99,592	11.95	0.76
7670	DENTAL CLINIC	71	112,911	1,297	13	$12,130	7	8	8	16	39	$8,123	$1,164	$9,287	$109,977	11.84	0.77
0202	PHYS FITNESS CTR	46	77,018	2,760	18	$16,168	14	8	7	33	62	$11,910	$1,269	$13,179	$150,075	11.39	0.82
0741	MNT HANGAR COMB	0	62,035	2,677	26	$14,214	4	8	4	20	36	$11,066	$1,164	$12,230	$132,917	10.87	0.86
8071	RGT HQ BUILD	15	131,511	300	8	$7,238	2	8	2	11	23	$4,895	$1,034	$5,929	$64,332	10.85	0.82
5800	YOUTH CTR	79	191,057	1,422	23	$16,314	10	11	10	25	56	$11,764	$2,147	$13,911	$146,990	10.57	0.85
0319	GEN INSTR BLDG	32	76,592	499	10	$6,275	5	3	4	10	22	$4,372	$1,128	$5,500	$56,372	10.25	0.88
8330	VEH MNT SHOP ORG	10	159,847	1,620	10	$13,768	10	7	6	25	48	$10,369	$2,010	$12,379	$125,765	10.16	0.90
0405	ADMIN GEN PURP	58	79,203	1,169	11	$9,832	5	2	7	19	33	$7,949	$1,034	$8,983	$89,499	9.96	0.91
8100	CONSOLIDATED MNT	115	1,581,158	10,388	59	$112,445	64	58	31	179	332	$77,305	$26,040	$103,345	$1,018,279	9.85	0.92
0722	FLIGHT SIMULATOR	62	255,249	870	17	$16,105	7	10	8	31	56	$11,164	$3,724	$14,888	$143,595	9.64	0.92
5302	POST OFFICE	45	134,508	367	15	$8,586	5	8	5	15	33	$6,765	$1,347	$8,112	$76,141	9.39	0.94
7264	LIBRARY MAIN	94	195,808	1,161	14	$15,609	9	15	7	32	63	$13,104	$1,873	$14,977	$139,947	9.34	0.96
0203	CAVALRY MUSEUM	54	64,425	589	14	$6,801	8	4	5	12	29	$5,696	$1,269	$6,965	$61,104	8.77	1.02
7854	BN HQ BLDG	74	105,963	143	11	$7,119	5	4	6	14	29	$6,107	$1,164	$7,271	$62,406	8.58	1.02
5315	MORRIS HILL CHAPEL	132	160,451	676	22	$13,309	14	3	16	21	54	$12,413	$1,347	$13,760	$117,972	8.57	1.03
7485	BOWLING ALLEY	116	309,641	1,303	20	$21,589	10	12	8	34	64	$15,521	$7,244	$22,765	$192,718	8.47	1.05
7638	BN ADMIN & CLRM	36	105,513	207	12	$6,421	4	7	4	12	27	$5,524	$1,210	$6,734	$56,712	8.42	1.05
8069	IN SW POOL/GYM	12	148,240	2,669	12	$17,725	16	21	4	47	88	$18,147	$1,834	$19,981	$163,722	8.19	1.13
0406	CID BLDG	28	65,052	700	12	$6,568	3	9	5	13	30	$6,336	$1,034	$7,370	$59,579	8.08	1.12

7624	BN ADMIN & CLRM	36	111,987	219	12	$6,739	4	8	4	14	30	$6,195	$1,210	$7,405	$59,544	8.04	1.10
7108	BN ADMIN & CLRM	12	97,067	281	11	$5,727	3	8	3	11	25	$5,281	$1,210	$6,491	$51,008	7.86	1.13
7630	BN ADMIN & CLRM	36	108,687	213	12	$6,579	4	8	4	14	30	$6,195	$1,210	$7,405	$58,124	7.85	1.13
0222	ADMIN GEN PURP	34	70,345	484	11	$6,043	6	3	6	12	27	$5,610	$1,347	$6,957	$54,266	7.80	1.15
0602	DENTAL CLINIC	67	161,751	555	18	$11,104	12	9	9	22	52	$10,651	$2,147	$12,798	$98,668	7.71	1.15
7856	ENL PERS DIN	77	72,397	1,158	8	$9,927	8	9	7	26	50	$10,545	$1,164	$11,709	$90,196	7.70	1.18
7865	UNIT CHAPEL	46	79,893	461	13	$6,682	7	3	6	15	31	$6,676	$1,098	$7,774	$59,719	7.68	1.16
7804	ENL PERS DIN	80	68,819	1,158	8	$9,839	8	9	7	26	50	$10,545	$1,098	$11,643	$89,410	7.68	1.18
7806	BN HQ BLDG	74	105,963	142	11	$7,114	6	5	7	15	33	$7,065	$1,098	$8,163	$62,363	7.64	1.15
7920	VEH MNT SHOP DS	48	344,189	4,073	21	$32,721	31	32	13	98	174	$36,562	$3,610	$40,172	$299,449	7.45	1.23
7620	BN ADMIN & CLRM	25	74,734	435	12	$5,796	4	8	4	14	30	$6,195	$1,210	$7,405	$52,002	7.02	1.28
7218	BN HQ BLDG	37	97,887	331	13	$6,659	5	8	6	16	35	$7,433	$1,073	$8,506	$59,180	6.96	1.28
0853	MNT HANGAR AVUM	22	196,818	1,082	16	$13,532	15	17	6	46	84	$16,600	$1,052	$17,652	$121,917	6.91	1.30
8380	VEH MNT SHOP ORG	67	385,062	1,639	15	$24,727	24	29	9	78	140	$29,369	$2,764	$32,133	$221,649	6.90	1.30
8410	VEH MNT SHOP ORG	67	385,062	1,764	15	$25,244	24	29	9	78	140	$29,369	$3,610	$32,979	$226,578	6.87	1.31
8390	TAC EQUIP SHOP	11	98,598	945	10	$8,495	9	8	5	26	48	$10,439	$1,073	$11,512	$77,373	6.72	1.36
0330	DEH ADMIN	24	116,801	618	18	$8,407	12	12	6	24	54	$10,128	$1,128	$11,256	$75,468	6.70	1.34
7836	BN ADMIN & CLRM	88	208,699	515	23	$13,526	7	24	8	38	77	$16,451	$2,010	$18,461	$119,648	6.48	1.36
7824	BN ADMIN & CLRM	88	208,699	515	23	$13,526	7	24	8	38	77	$16,451	$2,010	$18,461	$119,648	6.48	1.36
0814	MEDICAL FAC - NEW	30	80,234	549	19	$6,801	7	8	8	17	40	$8,389	$1,052	$9,441	$61,104	6.47	1.39
0835	MAF OPS BLDG	32	165,403	367	11	$9,424	3	4	3	15	25	$6,738	$6,332	$13,070	$83,606	6.40	1.39
0817	MNT HANGAR AVUM	18	240,516	553	19	$13,122	16	15	7	46	84	$16,442	$1,852	$18,294	$116,693	6.38	1.39
7017	BN HQ BLDG	8	26,027	152	3	$1,988	2	2	1	4	9	$1,688	$1,128	$2,816	$17,851	6.34	1.42
0029	RED CROSS BLDG	11	23,529	416	6	$3,104	4	4	2	8	18	$3,376	$1,128	$4,504	$28,431	6.31	1.45
6910	EXC SP ST FAC	8	14,588	514	6	$3,078	4	4	2	8	18	$3,376	$1,210	$4,586	$28,526	6.22	1.49
7820	BN ADMIN & CLRM	22	65,750	382	12	$5,135	4	8	4	14	30	$6,195	$1,210	$7,405	$46,052	6.22	1.44
7212	CO HQ BLDG	2	38,414	820	6	$5,151	7	4	3	18	32	$6,629	$1,073	$7,702	$47,715	6.20	1.50
8360	VEH MNT SHOP ORG	6	80,015	1,874	12	$11,463	12	14	6	40	72	$15,188	$2,010	$17,198	$106,325	6.18	1.50
7270	BN HQ BLDG	26	62,563	417	15	$5,315	4	9	4	15	32	$6,651	$1,073	$7,724	$47,698	6.18	1.45
0724	FLIGHT SIMULATOR	40	130,611	553	23	$9,249	10	11	11	24	56	$11,516	$1,964	$13,480	$82,520	6.12	1.46
7086	UNIT CHAPEL	34	56,713	555	16	$5,876	6	3	7	19	35	$7,817	$1,128	$8,945	$52,992	5.92	1.52
1470	AR VEH MNT SHOP	10	113,444	891	14	$8,937	11	6	8	24	49	$10,520	$3,280	$13,800	$81,071	5.87	1.54
0302	FINANCE ADMIN	45	139,855	795	15	$10,553	7	6	6	23	42	$10,512	$6,408	$16,920	$94,737	5.60	1.60
8370	VEH MNT SHOP ORG	13	68,566	1,125	6	$7,933	9	11	4	29	53	$11,181	$2,010	$13,191	$73,007	5.53	1.66
7220	CO HQ BLDG	56	59,504	563	14	$6,550	11	4	8	23	46	$9,553	$1,073	$10,626	$58,802	5.53	1.62
7109	BN ADMIN & CLRM	91	193,078	235	22	$11,789	8	3	9	19	39	$10,834	$8,250	$19,084	$103,521	5.42	1.62
0812	ADMIN & SUPPORT BLD	10	78,701	790	6	$6,896	8	5	3	30	46	$9,854	$1,852	$11,706	$62,893	5.37	1.70
0301	FINANCE ADMIN	89	243,190	1,108	31	$17,627	9	13	11	47	80	$18,287	$12,488	$30,775	$157,433	5.12	1.75
7033	BN HQ BLDG	3	40,044	199	4	$2,648	3	3	2	9	17	$3,559	$1,128	$4,687	$23,819	5.08	1.77
7656	GEN INST BLDG	79	79,637	509	21	$7,898	7	16	8	27	58	$12,328	$1,898	$14,226	$70,291	4.94	1.80
0833	AIRCRAFT HANGAR	9	92,061	432	16	$6,205	10	8	6	24	48	$9,439	$1,852	$11,291	$55,655	4.93	1.82
0810	ADMIN & SUPPLY BLDG	15	67,888	508	9	$5,489	8	4	4	26	42	$9,079	$1,052	$10,131	$49,614	4.90	1.85
7654	ENL PERS DIN	77	79,101	702	18	$8,567	10	10	9	41	70	$12,256	$3,658	$15,914	$76,784	4.82	1.86
0313	CIV PERS BLDG	14	16,769	84	3	$1,481	2	2	1	4	9	$1,688	$1,128	$2,816	$13,150	4.67	[illegible]

0727	MNT HANGAR COMB	35	106,473	774	17	$8,895	14	8	13	32	67	$15,254	$1,964	$17,218	$80,164	4.66	1.94
0806	COMB AC-HTG PLANT	134	17,013	18	20	$4,662	16	0	10	14	40	$7,546	$1,052	$8,598	$40,015	4.65	1.84
7739	MVNG TRGT SIM BLDG	17	48,916	311	15	$4,092	5	8	5	15	33	$6,765	$1,164	$7,929	$36,688	4.63	1.94
7622	BN ADMIN & CLRM	53	143,225	433	23	$9,608	7	24	8	38	77	$16,451	$2,010	$18,461	$85,214	4.62	1.92
7432	ADMIN & SUPPORT BLD	19	65,480	540	8	$5,596	10	5	6	27	48	$9,942	$1,164	$11,106	$50,636	4.56	1.98
0804	RGT HQ BUILD	14	52,305	116	8	$3,179	2	7	2	13	24	$5,256	$1,052	$6,308	$28,135	4.46	1.98
8065	CLINIC W/O BEDS	1	38,471	436	8	$3,605	3	9	3	14	29	$6,390	$1,034	$7,424	$32,946	4.44	2.06
7034	CLINIC W/O BEDS	0	36,882	363	9	$3,234	2	8	4	12	26	$5,524	$1,128	$6,652	$29,465	4.43	2.06
7410	BN ADMIN & CLRM	37	84,221	337	13	$6,124	5	4	6	19	34	$7,750	$4,593	$12,343	$54,493	4.41	2.02
0751	AC PTS & TOE ST	3	12,986	350	7	$2,226	4	2	5	7	18	$3,916	$764	$4,680	$20,562	4.39	2.10
7604	GEN INST BLDG	78	86,059	467	21	$7,974	8	19	8	33	68	$14,444	$1,964	$16,408	$70,837	4.32	2.06
6918	SKILL DEV CTR	0	108,121	1,115	0	$9,059	9	24	0	49	82	$17,276	$2,010	$19,286	$82,985	4.30	2.13
8021	ADMIN & SUPPORT BLD	3	53,799	618	3	$4,919	7	6	2	29	44	$9,545	$1,034	$10,579	$45,056	4.26	2.15
7858	ADMIN & SUPPORT BLD	12	18,344	161	7	$1,897	3	0	4	5	12	$2,878	$1,164	$4,042	$17,033	4.21	2.13
0610	ENL BARRACKS W/AS	131	2,030	4	12	$3,721	8	1	5	15	29	$6,275	$1,347	$7,622	$31,774	4.17	2.05
7245	ENL PERS DIN	18	76,912	654	17	$6,730	8	11	6	42	67	$11,884	$2,833	$14,717	$60,899	4.14	2.19
7520	VEH MNT SHOP ORG	0	48,512	1,250	0	$7,152	11	15	2	40	68	$14,579	$1,873	$16,452	$66,651	4.05	2.30
0253	DRUG ABUSE CTR	46	117,379	1,005	14	$10,498	13	21	7	55	96	$20,572	$2,947	$23,519	$94,900	4.04	2.24
7606	ENL PERS DIN	71	66,215	641	18	$7,614	10	11	9	44	74	$13,365	$3,829	$17,194	$68,273	3.97	2.26
7636	REGIMENTAL HQ BLDG	29	46,217	131	11	$3,447	7	2	7	14	30	$6,551	$1,210	$7,761	$30,421	3.92	2.25
0003	POST CHAPEL	1	21,908	271	7	$2,201	4	3	4	9	20	$4,007	$1,128	$5,135	$20,118	3.92	2.33
8023	ADMIN & SUPPORT BLD	2	43,522	619	3	$4,463	7	6	2	29	44	$9,545	$1,034	$10,579	$41,064	3.88	2.37
8059	ADMIN & SUPPORT BLD	2	43,522	619	3	$4,463	7	6	2	29	44	$9,545	$1,128	$10,673	$41,064	3.85	2.39
8057	ADMIN & SUPPORT BLD	2	43,522	618	3	$4,459	7	6	2	29	44	$9,545	$1,128	$10,673	$41,034	3.84	2.39
0006	POST CHAPEL	7	44,244	356	7	$3,649	6	8	3	19	36	$7,506	$1,128	$8,634	$33,047	3.83	2.37
0404	ENL BARRACKS W/DAS	108	34,513	322	15	$5,875	9	9	9	30	57	$11,809	$1,834	$13,643	$51,798	3.80	2.32
0840	VEHICLE MNT SHOP OR	8	44,131	317	7	$3,488	7	5	4	19	35	$7,337	$1,052	$8,389	$31,517	3.76	2.40
7900	VEH MNT SHOP ORG	0	55,902	965	0	$6,285	11	15	2	40	68	$14,579	$1,098	$15,677	$58,165	3.71	2.49
7500	VEH MNT SHOP ORG	0	55,902	1,029	0	$6,548	11	15	2	40	68	$14,579	$1,873	$16,452	$60,667	3.69	2.51
7450	REGIMENTAL HQ BLDG	29	39,781	121	11	$3,138	6	3	6	14	29	$6,437	$1,073	$7,510	$27,677	3.69	2.39
7720	VEH MNT SHOP ORG	0	55,902	1,029	0	$6,548	11	15	2	40	68	$14,579	$1,964	$16,543	$60,667	3.67	2.53
7940	VEH MNT SHOP ORG	0	48,512	1,018	0	$6,200	11	15	2	40	68	$14,579	$1,210	$15,789	$57,579	3.65	2.55
7350	VEH MNT SHOP ORG	0	51,715	1,034	0	$6,395	11	15	2	40	68	$14,579	$1,873	$16,452	$59,342	3.61	2.57
7960	VEH MNT SHOP ORG	0	55,902	920	0	$6,100	11	15	2	40	68	$14,579	$1,210	$15,789	$56,405	3.57	2.59
8020	DET DAY ROOM	2	22,155	67	0	$1,253	1	3	0	6	10	$2,116	$1,034	$3,150	$11,192	3.55	2.51
8010	DET DAY ROOM	2	22,155	67	0	$1,253	1	3	0	6	10	$2,116	$1,034	$3,150	$11,192	3.55	2.51
7802	ADMIN & SUPPORT BLD	12	18,344	161	11	$1,993	3	0	6	8	17	$4,044	$1,098	$5,142	$17,852	3.47	2.58
0207	CAVALRY MUSEUM	28	119,303	670	46	$9,499	16	24	13	55	108	$22,425	$2,069	$24,494	$85,016	3.47	2.58
7826	CLINIC W/O BEDS	8	23,854	324	12	$2,824	4	8	4	14	30	$6,195	$1,210	$7,405	$25,673	3.47	2.62
8046	DET DAY ROOM	2	22,155	67	0	$1,253	1	3	0	6	10	$2,116	$1,128	$3,244	$11,192	3.45	2.59
8056	DET DAY ROOM	2	22,155	67	0	$1,253	1	3	0	6	10	$2,116	$1,128	$3,244	$11,192	3.45	2.59
8340	VEH MNT SHOP ORG	0	55,902	933	0	$6,152	11	15	2	40	68	$14,579	$2,010	$16,589	$56,896	3.43	2.70
8320	VEH MNT SHOP ORG	0	55,902	933	0	$6,152	11	15	2	40	68	$14,579	$2,010	$16,589	$56,896	3.43	2.70
8300	VEH MNT SHOP ORG	0	55,902	933	0	$6,152	11	15	2	40	68	$14,579	$2,010	$16,589	$56,896	3.43	2.70

7028	BN CLASSROOMS	2	34,535	67	7	$1,932	4	0	4	9	17	$4,074	$1,128	$5,202	$17,115	3.29	2.69
7760	VEH MNT SHOP ORG	0	49,203	878	0	$5,650	11	15	2	40	68	$14,579	$1,898	$16,477	$52,320	3.18	2.92
7031	BN HQ BLDG	1	30,981	66	7	$1,755	2	0	4	9	15	$3,797	$1,128	$4,925	$15,561	3.16	2.81
7626	CLINIC W/O BEDS	10	28,096	311	13	$3,009	5	8	6	16	35	$7,433	$1,210	$8,643	$27,240	3.15	2.87
7808	ADMIN & SUPPORT BLD	14	23,079	164	14	$2,308	4	0	7	12	23	$5,462	$1,098	$6,560	$20,602	3.14	2.84
7036	REGIMENTAL HQ BLDG	2	47,024	74	4	$2,406	5	2	4	13	24	$5,713	$1,128	$6,841	$21,312	3.12	2.84
7780	VEH MNT SHOP ORG	0	55,902	791	0	$5,568	11	15	2	40	68	$14,579	$1,898	$16,477	$51,328	3.12	2.96
7834	REGIMENTAL HQ BLDG	28	28,924	32	11	$2,299	4	0	7	11	22	$5,278	$1,210	$6,488	$20,041	3.09	2.82
0720	AF OPS BLDG	15	26,324	245	9	$2,705	6	8	3	18	35	$6,805	$1,164	$7,969	$24,352	3.06	2.95
7852	ADMIN & SUPPORT BLD	19	25,600	164	18	$2,644	5	0	9	14	28	$6,557	$1,164	$7,721	$23,498	3.04	2.92
7046	BN CLASSROOMS	2	30,324	66	7	$1,755	4	0	4	9	17	$4,074	$1,073	$5,147	$15,559	3.02	2.93
0402	ENL BARRACKS W/AS	79	38,560	322	23	$5,476	6	21	9	36	72	$15,207	$1,034	$16,241	$48,433	2.98	2.97
7047	BN HQ BLDG	1	28,238	66	7	$1,630	2	0	4	9	15	$3,797	$1,073	$4,870	$14,467	2.97	2.99
0364	UEMCS HQ	3	6,221	118	3	$878	2	2	1	4	9	$1,688	$1,128	$2,816	$8,040	2.86	3.21
7048	BN HQ BLDG	1	26,812	46	7	$1,500	2	0	4	9	15	$3,797	$1,073	$4,870	$13,257	2.72	3.25
7215	BN HQ BLDG	7	23,136	1	10	$1,390	3	2	4	8	17	$3,424	$1,073	$4,497	$12,101	2.69	3.24
7305	APP INSTR BLDG	16	21,606	369	12	$3,109	8	12	4	24	48	$9,436	$1,073	$10,509	$28,264	2.69	3.38
7648	ENL BARRACKS W/O DI	131	18,018	838	51	$8,748	12	42	17	60	131	$27,848	$1,898	$29,746	$78,256	2.63	3.40
7646	ENL BARRACKS W/O DI	124	18,018	838	42	$8,369	9	42	14	60	125	$26,690	$1,898	$28,588	$75,022	2.62	3.42
7650	ENL BARRACKS W/O DI	122	17,840	838	42	$8,306	9	42	14	60	125	$26,690	$1,898	$28,588	$74,484	2.61	3.44
0410	ENL BARRACKS W/AS	88	45,848	206	26	$5,596	8	22	11	41	82	$18,089	$1,034	$19,123	$49,051	2.57	3.42
7644	ENL BARRACKS W/O DI	116	17,840	838	42	$8,143	9	42	14	60	125	$26,690	$1,898	$28,588	$73,092	2.56	3.51
7642	ENL BARRACKS W/O DI	115	17,840	838	42	$8,128	9	42	14	60	125	$26,690	$1,898	$28,588	$72,970	2.55	3.52
7618	ENL BARRACKS W/O DI	116	17,840	838	42	$8,143	9	42	14	60	125	$26,690	$2,069	$28,759	$73,092	2.54	3.53
5309	GUEST HOUSE	45	875	7	15	$1,569	4	0	9	6	19	$4,048	$1,347	$5,395	$13,420	2.49	3.44
7243	ADMIN & SUPPORT BLD	0	30,837	120	13	$2,089	8	1	6	14	29	$6,518	$1,073	$7,591	$18,629	2.45	3.63
0227	ENL BARRACKS W/AS	77	43,122	291	22	$5,461	9	20	11	44	84	$17,517	$2,147	$19,664	$48,225	2.45	3.60
0214	ENL BARRACKS W/AS	81	45,379	288	27	$5,770	13	21	11	47	92	$18,822	$2,147	$20,969	$50,875	2.43	3.63
7848	ENL BARRACKS W/O DI	83	1,292	17	24	$2,805	7	0	12	22	41	$9,334	$1,164	$10,498	$24,010	2.29	3.74
7844	ENL BARRACKS W/O DI	83	1,292	17	24	$2,805	7	0	12	22	41	$9,334	$1,164	$10,498	$24,010	2.29	3.74
8025	BN ADMIN & CLRM	5	94,052	4	21	$4,527	5	25	5	37	72	$15,592	$1,834	$17,426	$39,607	2.27	3.85
7850	ENL BARRACKS W/AS	82	1,269	17	24	$2,776	7	0	12	22	41	$9,334	$1,164	$10,498	$23,764	2.26	3.78
7846	ENL BARRACKS W/AS	82	1,269	17	24	$2,776	7	0	12	22	41	$9,334	$1,164	$10,498	$23,764	2.26	3.78
7842	ENL BARRACKS W/AS	82	1,269	17	24	$2,776	7	0	12	22	41	$9,334	$1,164	$10,498	$23,764	2.26	3.78
0223	ENL BARRACKS W/DAS	96	40,608	365	33	$6,430	13	29	12	54	108	$23,175	$2,147	$25,322	$56,767	2.24	3.94
8037	BN ADMIN & CLRM	5	93,519	4	21	$4,505	6	25	6	36	73	$15,794	$1,928	$17,722	$39,413	2.22	3.93
5000	FIRE STATION	8	5,161	269	12	$1,826	3	8	4	16	31	$6,408	$1,347	$7,755	$16,735	2.16	4.25
0723	MNT HANGAR COMB	0	8,374	431	10	$2,363	7	3	8	18	36	$9,163	$1,164	$10,327	$22,021	2.13	4.37
8044	APP INSTR BLDG	9	6,611	105	3	$1,006	3	4	1	8	16	$3,133	$1,128	$4,261	$9,078	2.13	4.24
0411	ENL BARRACKS W/AS	84	45,856	191	28	$5,500	9	28	12	51	100	$21,870	$1,834	$23,704	$48,176	2.03	4.31
0409	ENL BARRACKS W/AS	84	45,856	191	31	$5,572	9	29	12	52	102	$22,326	$1,834	$24,160	$48,791	2.02	4.34
7818	ENL BARRACKS W/O DI	85	4,701	98	27	$3,424	10	4	13	31	58	$12,794	$1,898	$14,692	$29,658	2.02	4.29
0540	OFF QTRS MILIT	40	700	7	17	$1,492	3	0	7	14	24	$5,411	$1,034	$6,445	$12,766	1.98	4.32
0542	OFF QTRS MILIT	40	700	7	17	$1,492	3	0	7	14	24	$5,411	$1,034	$6,445	$12,766	1.98	4.32

7816	ENL BARRACKS W/O DI	81	4,696	98	27	$3,306	10	4	13	31	58	$12,794	$1,898	$14,692	$28,652	1.95	4.44
7812	ENL BARRACKS W/O DI	81	4,696	98	27	$3,306	10	4	13	31	58	$12,794	$1,898	$14,692	$28,652	1.95	4.44
7616	ENL BARRACKS W/AS	82	4,634	99	27	$3,339	10	4	13	31	58	$12,794	$2,069	$14,863	$28,936	1.95	4.45
0211	ADMIN	3	15,902	125	17	$1,661	5	6	7	14	32	$6,474	$1,269	$7,743	$14,847	1.92	4.66
7810	ENL BARRACKS W/O DI	78	4,634	98	27	$3,228	10	4	13	31	58	$12,794	$1,898	$14,692	$27,990	1.91	4.55
7814	ENL BARRACKS W/O DI	78	4,634	98	27	$3,228	10	4	13	31	58	$12,794	$1,898	$14,692	$27,990	1.91	4.55
7614	ENL BARRACKS W/AS	78	4,634	99	27	$3,229	10	4	13	31	58	$12,794	$2,069	$14,863	$27,993	1.88	4.60
0710	TAC EQUIP SHOP	5	14,809	118	7	$1,396	6	3	4	13	26	$5,505	$1,164	$6,669	$12,543	1.88	4.78
0512	SR ENL QTRS	39	2,786	17	11	$1,455	5	3	7	12	27	$5,692	$1,034	$6,726	$12,510	1.86	4.62
7612	ENL BARRACKS W/AS	76	4,634	99	27	$3,183	10	4	13	31	58	$12,794	$2,069	$14,863	$27,604	1.86	4.67
0650	COLD STOR FAC	0	0	0	34	$816	0	0	0	13	13	$2,452	$1,347	$3,799	$6,960	1.83	4.66
0541	OFF QTRS MILIT	40	700	7	18	$1,516	3	0	8	16	27	$6,263	$1,034	$7,297	$12,971	1.78	4.81
7658	ADMIN & SUPPORT BLD	16	20,505	169	11	$2,220	8	10	6	26	50	$10,442	$1,098	$11,540	$19,847	1.72	5.20
7610	ENL BARRACKS W/AS	63	4,459	99	27	$2,849	10	4	13	31	58	$12,794	$2,069	$14,863	$24,754	1.67	5.22
0652	COLD STOR FAC	0	0	0	18	$432	0	0	0	5	5	$979	$1,347	$2,326	$3,685	1.58	5.38
7050	ENL BARRACKS W/AS	21	18,887	78	25	$2,231	6	4	12	30	52	$11,634	$1,073	$12,707	$19,551	1.54	5.69
7404	ENL BARRACKS W/O DI	8	29,731	18	24	$2,089	5	14	9	24	52	$10,997	$1,073	$12,070	$18,200	1.51	5.78
7424	ENL BARRACKS W/O DI	8	28,331	5	24	$1,975	5	14	9	24	52	$10,997	$1,073	$12,070	$17,159	1.42	6.11
7652	ADMIN & SUPPORT BLD	16	20,505	6	11	$1,546	8	10	6	26	50	$10,442	$1,098	$11,540	$13,418	1.16	7.47
7176	MOTOR POOL MNT SHO	0	2,048	42	4	$354	2	0	4	3	9	$2,228	$728	$2,956	$3,217	1.09	8.34
7602	ADMIN & SUPPORT BLD	15	18,220	6	11	$1,422	8	10	6	26	50	$10,442	$1,269	$11,711	$12,344	1.05	8.23
7608	ADMIN & SUPPORT BLD	15	16,655	6	11	$1,358	8	10	6	26	50	$10,442	$1,164	$11,606	$11,777	1.01	8.55
0027	OFF QTRS MILIT	6	0	5	14	$500	2	0	6	6	14	$3,104	$1,128	$4,232	$4,282	1.01	8.47
7053	ENL BARRACKS W/AS	7	0	25	21	$773	3	0	9	15	27	$6,068	$1,073	$7,141	$6,696	0.94	9.24
8006	ENL BARRACKS W/O DI	7	0	4	3	$277	1	1	1	7	10	$2,527	$1,034	$3,561	$2,380	0.67	12.84
8002	ENL BARRACKS W/O DI	7	0	4	3	$277	1	1	1	7	10	$2,527	$1,034	$3,561	$2,380	0.67	12.84
8042	ENL BARRACKS W/O DI	7	0	4	3	$277	1	1	1	7	10	$2,527	$1,128	$3,655	$2,380	0.65	13.18
8038	ENL BARRACKS W/O DI	7	0	4	3	$277	1	1	1	7	10	$2,527	$1,128	$3,655	$2,380	0.65	13.18
8052	SR ENL QTRS	7	0	4	3	$277	1	1	1	7	10	$2,527	$1,128	$3,655	$2,380	0.65	13.18
0621	OFF QTRS TRANS	0	4,800	2	0	$208	1	1	1	3	6	$1,495	$1,347	$2,842	$1,829	0.64	13.69
0760	BN HQ BLDG	0	0	0	7	$168	1	1	3	2	7	$1,471	$764	$2,235	$1,433	0.64	13.30
8012	ENL BARRACKS W/O DI	5	0	4	3	$205	1	1	1	7	10	$2,527	$1,034	$3,561	$1,764	0.50	17.37
8008	ENL BARRACKS W/O DI	2	0	2	3	$142	1	1	1	7	10	$2,527	$1,034	$3,561	$1,223	0.34	24.99
8014	ENL BARRACKS W/O DI	2	0	2	3	$142	1	1	1	7	10	$2,527	$1,034	$3,561	$1,223	0.34	24.99
8050	ENL BARRACKS W/O DI	2	0	2	3	$142	1	1	1	7	10	$2,527	$1,128	$3,655	$1,223	0.33	25.65
8048	ENL BARRACKS W/O DI	2	0	2	3	$142	1	1	1	7	10	$2,527	$1,128	$3,655	$1,223	0.33	25.65
8040	ENL BARRACKS W/O DI	2	0	2	3	$142	1	1	1	7	10	$2,527	$1,128	$3,655	$1,223	0.33	25.65
8054	ENL BARRACKS W/O DI	2	0	2	3	$124	1	1	1	7	10	$2,527	$1,128	$3,655	$1,069	0.29	29.38
7178	MOTOR POOL ADMIN	0	676	7	0	$57	2	0	2	4	8	$2,426	$728	$3,154	$521	0.17	55.46
0620	OFF QTRS MILIT	0	0	2	0	$9	0	1	0	3	4	$1,109	$1,347	$2,456	$89	0.04	263.63

BLDG NO	BLDG NAME	KW SVGS PER YR	KWH SVGS PER YR	MBtu SVGS PER YR	LABOR HOUR SVGS. PER YR	$ COST SVGS PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL BLDG POINTS	SYSTEM HARDWR COST	RCU/ACU COST	TOTAL HARDWR COST	TOTAL DISC SVGS	SIR	SIMPLE

TOT. kW SVGS	TOT. kWH SVGS	TOT. MBtu	TOT. LBR HR SVGS	TOT. CST SVGS	TOT. BLDG PNTS	TOT. SYS HARDWR CST	TOT. RCU/ ACU	TOT. HARDWR COST	TOT. DISC SAVINGS
7,582	17,108,240	153,433	2,941	1,602,487	9,914	2,130,927	370,167.00	2,501,094	14,477,998

TOT DO PNTS	TOT AO PNTS	TOT DI PNTS	TOT AI PNTS
1,531	1,897	1,310	5,176

TOTAL FOR NON-QUALIFYING BUILDINGS (SIRs less than 1.25)

KW SVGS. PER YR	KWH SVGS. PER YR	MBtu SVGS. PER YR	LABOR HOUR SVGS. PER YR	$ COST SVGS PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL BLDG POINTS	SYSTEM HARDWR COST	RCU/ACU COST	TOTAL HARDWR COST	TOTAL DISC SVGS
111	62,904	137	115	$8,819	47	45	55	198	345	$79,551	$23,185	$103,263	$76,454

TOTAL FOR QUALIFYING BUILDINGS (SIRs greater than 1.25)

KW SVGS. PER YR	KWH SVGS. PER YR	MBtu SVGS. PER YR	LABOR HOUR SVGS. PER YR	$ COST SVGS PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL BLDG POINTS	SYSTEM HARDWR COST	RCU/ACU COST	TOTAL HARDWR COST	TOTAL DISC SVGS
7,471	17,045,336	153,296	2,826	$1,593,668	1,484	1,852	1,255	4,978	9,569	$2,051,376	$346,982	$2,397,831	$14,401,544
	(Water Level Alarms in Basement MERs)						71		71	$11,147		$11,147	
	(Pneumatic Control Air Monitoring)						112		112	$11,984		$11,984	
7,471	17,045,336	153,296	2,826	$1,593,668	1,484	1,852	1,438	4,978	9,752	$2,074,507	$346,982	$2,420,962	$14,401,544

ENERGY SAVINGS

Table ES-2 below summarizes the potential energy savings for the proposed UMCS configuration. Column A of this table lists the energy savings for the buildings analyzed for the proposed UMCS. Column B lists the energy usage and energy costs incurred at Fort Riley in FY94. Column C lists the percent savings predicted for the proposed UMCS configuration.

Table ES- 2. Energy Savings Summary

	(A) Annual Energy Savings	(B) Current Energy Usage	(C) % Savings (A)/(B)
Proposed UMCS Electricity (kWh)	17,045,336	169,353,256	10.1%
Proposed UMCS Nat. Gas (MBtu)	153,296	1,244,183	12.3%

IMPLEMENTATION COSTS

The listing of implementation costs and total anticipated contract costs for the proposed UMCS are presented in Table ES-3 on page ES-10.

Table ES- 3. Implementation Costs

	Proposed UMCS (1995 $)
UMCS Software/Database	$ 144,580
Central UMCS Hardware	109,008
Training	73,110
Documentation and Submittals	50,000
Testing	197,908
Total Field Hardware	2,420,962
Fiber Optic DTM	544,847
ACM Removal	15,567
RF System	49,619
FO and UMCS Equip. for Gas Meter Monitoring	17,368
SUBTOTAL	$3,622,969
Overhead (15%)	543,445
Bond (2.5%)	104,160
Profit (10%)	427,057
Contingency (10%)	469,763
ANTICIPATED CONTRACT COSTS	$5,167,394
S&A (7.0%)	$361,718
DESIGN (6.0%)	$310,044
TOTAL INVESTMENT	**$5,839,156**

SUMMARY

Table ES-4 below presents the economic summary of the proposed UMCS.

Table ES-4. System Economics

	Proposed UMCS (1995 $)
Total Investment, Per ECIP Guidance ($)	5,839,156
Annual Savings (MBtu)	211,472
First Year Energy Savings ($)	1,335,506
First Year Maintenance Manhours Savings ($)	67,824
First Year Electrical Demand Savings ($)	190,361
First Year Maintenance Cost ($)	(116,206)
Total Non-Energy Annual Recurring Savings ($)	(48,382)
Net First Year Savings ($)	1,477,485
Net Discounted Savings ($)	13,410,508
Simple Payback (years)	3.95
SIR	2.30

The proposed UMCS configuration has a simple payback of 3.95 years and a SIR of 2.30. The proposed UMCS will save 10.1% on electrical energy and 12.3% on natural gas energy.

RECOMMENDATIONS

It is recommended that the proposed UMCS be installed to control and monitor systems in 190 buildings, including replacement of the existing field hardware in the original 23 buildings. The UMCS should consist of a state-of-the-art PC-based front-end central operator station, field panels, field hardware control devices, and control wiring as outlined in the latest Corps of Engineer Guide Specification for Utility Monitoring and Control System, CEGS-16935.

It is recommended that a new data transmission system, consisting of contractor-installed underground FO cable be provided for all data communication needs to the 190 buildings recommended for the UMCS.

FORT RILEY SUPPORT

To be cost effective, the UMCS will need strong support from Fort Riley. If the UMCS is not supported, large sums of money may be spent on an UMCS that never meets the Fort Riley cost savings goals. The cost effectiveness of an UMCS depends on several factors, including the following:

- Proper training and motivation of operators to use a large, expensive UMCS.

- Coordination between UMCS operations and Fort Riley Public Works personnel, contractors, and others, to reduce wasted materials and labor, and duplication of effort.

- Basic training of shops personnel to assure their activities do not excessively hinder UMCS operations. Education will enable shops personnel to use the UMCS in their operation and maintenance (O&M) and utilities areas and thereby improve overall cost effectiveness.

- High priority of funding for UMCS maintenance in order to keep the system in good operating condition.

- Staffing requirements for operation and maintenance of the UMCS determined by Fort Riley Public Works.

- Periodic verification and validation of energy and O&M cost savings to ensure that the UMCS is performing as planned.

If successfully implemented, the UMCS can assist all personnel in carrying out their missions. The UMCS can save energy, predict equipment failure, detect equipment failure quickly, and schedule preventive maintenance. Significant potential for cost avoidance exists at Fort Riley if UMCS administration, operations, and maintenance activities are properly planned and implemented, and if the UMCS is used to its full capability.

1. GENERAL DESCRIPTION

1.1 AUTHORITY FOR FEASIBILITY STUDY FOR INSTALLATION OF UMCS

The Feasibility Study for Installation of UMCS was performed as part of the Energy Engineering Analysis Program (EEAP). The feasibility study was conducted and prepared under Contract No. DACA01-94-D-0033 issued by the Kansas City District Corps of Engineers on 12 September 1994.

1.2 PURPOSE OF ENERGY ENGINEERING ANALYSIS PROGRAM STUDY

The purpose of the Feasibility Study for Installation of UMCS at Fort Riley, Kansas is to determine the economic feasibility of replacing the existing EMCS with a Utility Monitoring and Control System (UMCS) and adding additional buildings to the UMCS. The existing pneumatic controls would be replaced with direct digital controls.

1.3 SCOPE OF WORK

The Scope of Work for this EEAP study is presented in Appendix A. The requirements outlined in the Scope of Work are summarized as follows:

- Review the available design, construction, and operational data for the existing UMCS and HVAC systems.
- Conduct a field survey of mechanical and electrical systems to be monitored and controlled by the UMCS in 214 buildings.
- Evaluate the mechanical and electrical systems to determine which UMCS applications are feasible, based on utility and labor cost savings.
- Determine the feasibility of connecting buildings to the UMCS.
- Illustrate the methods and approaches taken for the analysis.
- Perform a life cycle cost analysis (LCCA) to reflect savings-to-investment ratio (SIR) and simple payback calculations for recommended projects.
- Prepare complete programming or implementation documentation for all recommended projects.

- Prepare a comprehensive report to document the work performed, the results, and the recommendations.

1.4 APPROACH

The approach taken in performing the EEAP study included the following:

- Performing a field survey to document the nameplate and operational information of the existing mechanical and electrical systems.
- Collecting available information and data relative to historical energy usage, current utility rate schedules, building and equipment utilization, and existing energy conservation efforts.
- Reviewing existing building drawings, as available.
- Developing a preliminary point schedule which includes UMCS functions for each applicable building.
- Evaluating the energy savings available from each utility management function for each system, with the aid of computer energy simulations for typical buildings.
- Determining the cost to implement each function for each system.
- Evaluating the implementation costs and energy savings for each of the functions per system per building through extrapolating the computer energy simulation results.
- Summarizing savings and costs for utility management functions per system for each building, and ranking the buildings by SIR in order of priority.
- Performing LCCAs in accordance with Energy Conservation Investment Program (ECIP) guidance, using the calculated energy savings and UMCS implementation costs.

2. FACILITY DATA

2.1 GENERAL

Several types of buildings are evaluated in this study. The building types include administration buildings, barracks, chapels, clinics, dining facilities, maintenance shop buildings, recreational facilities, flight simulator buildings, and training buildings. The energy sources for these buildings include two fuel types, electricity and natural gas.

2.2 BUILDINGS INCLUDED IN ANALYSIS

A total of 214 buildings were analyzed to determine the economic benefits of UMCS monitoring and control. These buildings are listed in Table 2-1 by building number in ascending order.

Table 2-1. Buildings Evaluated for UMCS

Bldg. No.	Building Name	Bldg. Area (sq ft)
3	POST CHAPEL	8,828
6	POST CHAPEL	6,230
27	OFF QTRS MILIT	38,146
29	RED CROSS BLDG	3,000
200	ADMIN GENERAL PURP	60,690
202	PHYS FITNESS CTR	51,307
203	CAVALRY MUSEUM	5,800
205	CAVALRY MUSEUM	16,496
206	THEATER W/O DRESS RM	10,754
207	CAVALRY MUSEUM	8,278
210	MILIT PERS BLDG	58,448
211	ADMIN	41,062
214	ENL BARRACKS W/AS	35,821
222	ADMIN GEN PURP	18,854
223	ENL BARRACKS W/DAS	47,794
227	ENL BARRACKS W/AS	32,303
253	DRUG ABUSE CTR	11,122
301	FINANCE ADMIN	32,947
302	FINANCE ADMIN	16,138
313	CIV PERS BLDG	6,222
319	GEN INSTRUCTION BLDG	9,690
330	PW ADMIN	14,913
364	UEMCS HQ (Admin-block Type)	744
402	ENL BARRACKS W/AS	35,718
403	ADM GENERAL (DESIGN PREP)	18,151
404	ENL BARRACKS W/DAS	35,718
405	ADMIN GEN PURP	10,778
406	CID BLDG	10,390
409	ENL BARRACKS W/AS	32,883
410	ENL BARRACKS W/AS	32,883
411	ENL BARRACKS W/AS	32,883
500	POST HQ BLDG	65,453
509	ADM GEN PURPOSE	10,108
512	SR ENL QTRS	13,619
540	OFF QTRS MILIT	14,528
541	OFF QTRS MILIT	18,083
542	OFF QTRS MILIT	14,528
602	DENTAL CLINIC	11,557
610	ENL BARRACKS W/AS	29,004
620	OFF QTRS MILIT	12,640
621	OFF QTRS TRANS	10,723
650	COLD STOR FAC	22,331
652	COLD STOR FAC	8,167
710	TAC EQUIP SHOP	2,173

Bldg. No.	Building Name	Bldg. Area (sq ft)
720	AF OPS BLDG	3,705
722	FLIGHT SIMULATOR	7,000
723	MNT HANGAR COMB	21,640
724	FLIGHT SIMULATOR	13,188
727	MNT HANGAR COMB	36,152
741	MNT HANGAR COMB	38,898
751	AC PTS & TOE ST	9,834
760	BN HQ BLDG	7,364
802	BN ADMIN & CLRM	12,526
804	RGT HQ BUILD	10,241
806	COMB AC-HTG PLANT	1,000
808	BN ADMIN & CLRM	12,526
810	ADMIN & SUPPLY BLDG	15,152
812	ADMIN & SUPPLY BLDG	23,559
814	MEDICAL FAC - NEW	9,220
817	MNT HANGAR AVUM	40,061
820	TAC EQUIP SHOP	20,564
833	AIRCRAFT HANGAR	52,080
835	MAF OPS BLDG	19,470
840	VEHICLE MNT SHOP ORG	9,152
853	MNT HANGAR AVUM	48,112
1470	AR VEH MNT SHOP	21,667
4010	DENTAL CLINIC	15,587
5000	FIRE STATION	8,400
5302	POST OFFICE	12,240
5309	GUEST HOUSE	23,784
5315	MORRIS HILL CHAPEL	19,748
5800	YOUTH CTR	21,560
6620	COMMUN ACT CTR	31,740
6910	EXC SP ST FAC	2,525
6914	EXC MAIN RETL	63,930
6918	SKILL DEV CTR	11,507
6940	INDOOR SWIM POOL	23,347
7017	BN HQ BLDG	2,604
7024	GYMNASIUM	20,619
7028	BN CLASSROOMS	3,733
7031	BN HQ BLDG	3,733
7033	BN HQ BLDG	4,083
7034	CLINIC W/O BEDS	3,842
7036	REGIMENTAL HQ BLDG	10,010
7046	BN CLASSROOMS	3,733
7047	BN HQ BLDG	3,733
7048	BN HQ BLDG	2,604

Bldg. No.	Building Name	Bldg. Area (sq ft)
7050	ENL BARRACKS W/AS	39,675
7053	ENL BARRACKS W/AS	39,675
7086	UNIT CHAPEL	8,696
7108	BN ADMIN & CLRM	12,527
7109	BN ADMIN & CLRM	13,535
7176	MOTOR POOL MNT SHOP	4,880
7178	MOTOR POOL ADMIN	2,480
7210	CH CHILLER PLANT	4,320
7212	CO HQ BLDG	19,320
7215	BN HQ BLDG	2,604
7218	BN HQ BLDG	12,625
7220	CO HQ BLDG	18,870
7243	ADMIN & SUPPLY BLDG	17,829
7245	ENL PERS DIN	13,998
7264	LIBRARY MAIN	31,240
7270	BN HQ BLDG	6,130
7285	CLOTHING SALES	17,042
7305	APP INSTR BLDG	9,872
7350	VEH MNT SHOP ORG	21,345
7404	ENL BARRACKS W/O DIN	50,967
7410	BN ADMIN & CLRM	12,599
7424	ENL BARRACKS W/O DIN	50,967
7432	ADMIN & SUPPLY BLDG	13,500
7450	REGIMENTAL HQ BLDG	9,850
7485	BOWLING ALLEY	36,966
7500	VEH MNT SHOP ORG	22,325
7520	VEH MNT SHOP ORG	27,112
7602	ADMIN & SUPPLY BLDG	13,520
7604	GEN INST BLDG	13,493
7606	ENL PERS DIN	13,493
7608	ADMIN & SUPPLY BLDG	13,520
7610	ENL BARRACKS W/AS	41,892
7612	ENL BARRACKS W/AS	41,892
7614	ENL BARRACKS W/AS	41,892
7616	ENL BARRACKS W/AS	41,892
7618	ENL BARRACKS W/O DIN	41,892
7620	BN ADMIN & CLRM	6,340
7622	BN ADMIN & CLRM	12,380
7624	BN ADMIN & CLRM	6,158
7626	CLINIC W/O BEDS	3,604
7630	BN ADMIN & CLRM	6,158
7632	GYMNASIUM	20,694
7636	REGIMENTAL HQ BLDG	9,850

Bldg. No.	Building Name	Bldg. Area (sq ft)
7638	BN ADMIN & CLRM	6,158
7642	ENL BARRACKS W/O DIN	41,892
7644	ENL BARRACKS W/O DIN	41,892
7646	ENL BARRACKS W/O DIN	41,892
7648	ENL BARRACKS W/O DIN	41,892
7650	ENL BARRACKS W/O DIN	41,892
7652	ADMIN & SUPPLY BLDG	13,520
7654	ENL PERS DIN	13,493
7656	GEN INST BLDG	13,493
7658	ADMIN & SUPPLY BLDG	13,520
7665	DENTAL CLINIC	11,076
7670	DENTAL CLINIC	14,960
7720	VEH MNT SHOP ORG	22,325
7739	MOVING TARGET SIM BLDG	4,074
7760	VEH MNT SHOP ORG	17,163
7780	VEH MNT SHOP ORG	17,163
7802	ADMIN & SUPPLY BLDG	13,280
7804	ENL PERS DIN	13,493
7806	BN HQ BLDG	13,493
7808	ADMIN & SUPPLY BLDG	13,280
7810	ENL BARRACKS W/O DIN	41,843
7812	ENL BARRACKS W/O DIN	41,843
7814	ENL BARRACKS W/O DIN	41,843
7816	ENL BARRACKS W/O DIN	41,843
7818	ENL BARRACKS W/O DIN	41,843
7820	BN ADMIN & CLRM	6,673
7824	BN ADMIN & CLRM	12,246
7826	CLINIC W/O BEDS	3,841
7832	GYMNASIUM	20,694
7834	REGIMENTAL HQ BLDG	9,904
7836	BN ADMIN & CLRM	12,246
7842	ENL BARRACKS W/AS	41,843
7844	ENL BARRACKS W/O DIN	41,843
7846	ENL BARRACKS W/AS	41,843
7848	ENL BARRACKS W/O DIN	41,843
7850	ENL BARRACKS W/AS	41,843
7852	ADMIN & SUPPLY BLDG	13,280
7854	BN HQ BLDG	13,493
7856	ENL PERS DIN	13,493
7858	ADMIN & SUPPLY BLDG	13,280
7865	UNIT CHAPEL	8,718
7866	THEATER W/DRESS RM	11,098
7900	VEH MNT SHOP ORG	20,943

Bldg. No.	Building Name	Bldg. Area (sq ft)
7920	VEH MNT SHOP DS	124,553
7940	VEH MNT SHOP ORG	22,405
7960	VEH MNT SHOP ORG	20,245
8002	ENL BARRACKS W/O DIN	22,700
8006	ENL BARRACKS W/O DIN	22,700
8008	ENL BARRACKS W/O DIN	11,549
8010	DET DAY ROOM	2,100
8012	ENL BARRACKS W/O DIN	22,700
8014	ENL BARRACKS W/O DIN	11,549
8020	DET DAY ROOM	2,100
8021	ADMIN & SUPPLY BLDG	23,676
8023	ADMIN & SUPPLY BLDG	23,676
8025	BN ADMIN & CLRM	12,000
8037	BN ADMIN & CLRM	12,000
8038	ENL BARRACKS W/O DIN	22,700
8040	ENL BARRACKS W/O DIN	11,549
8042	ENL BARRACKS W/O DIN	22,700
8044	APP INSTR BLDG	2,470
8046	DET DAY ROOM	2,100
8048	ENL BARRACKS W/O DIN	11,549
8050	ENL BARRACKS W/O DIN	11,549
8052	SR ENL QTRS	22,700
8054	ENL BARRACKS W/O DIN	11,549
8056	DET DAY ROOM	2,100
8057	ADMIN & SUPPLY BLDG	23,676
8059	ADMIN & SUPPLY BLDG	23,676
8063	ENL PERS DIN	18,313
8065	CLINIC W/O BEDS	3,848
8069	IN SW POOL/GYM	25,620
8071	RGT HQ BUILD	9,963
8073	CH ENERGY PLANT	4,070
8100	CONSOLIDATED MNT	224,927
8300	VEH MNT SHOP ORG	20,240
8320	VEH MNT SHOP ORG	20,240
8330	VEH MNT SHOP ORG	39,256
8340	VEH MNT SHOP ORG	20,240
8360	VEH MNT SHOP ORG	39,428
8370	VEH MNT SHOP ORG	26,876
8380	VEH MNT SHOP ORG	73,400
8390	TAC EQUIP SHOP	24,755
8410	VEH MNT SHOP ORG	73,233

For the purpose of analysis, 18 representative buildings were modeled with a computer energy simulation program. Three of these buildings were each separated into two zones, to represent typical building areas. Therefore, a total of 21 computer energy simulations were modeled.

Table 2-2 below presents the buildings grouped by use and construction type. The 21 computer energy simulations used in the analysis are designated for a representative building in each group. The energy use and calculated energy savings for buildings in each group are extrapolated from the representative building.

Table 2-2. Building Groups for Computer Simulations

BLDG NO.	BLDG NAME	SQ FT	USE	COMP MODEL	HVAC SYSTEM TYPE
5000	FIRE STATION	8,400	24 hours	X	MZ / H&V / Gas IRs
313	CIV PERS BLDG	6,222	Admin		SZ w/ Duct Furnace
804	RGT HQ BUILD	10,241	Admin		MZ
7036	REGIMENTAL HQ BLDG	10,010	Admin		FCs / SZ
7178	MOTOR POOL ADMIN	2,480	Admin		Gas-Fired UHs / Win. ACs
7450	REGIMENTAL HQ BLDG	9,850	Admin	X	Dual Temp. FCs / SZ
7636	REGIMENTAL HQ BLDG	9,850	Admin		Dual Temp. FCs / SZ
7834	REGIMENTAL HQ BLDG	9,904	Admin		Dual Temp. FCs / SZ
8010	DET DAY ROOM	2,100	Admin		SZ
8020	DET DAY ROOM	2,100	Admin		SZ
8046	DET DAY ROOM	2,100	Admin		SZ
8056	DET DAY ROOM	2,100	Admin		SZ
8071	RGT HQ BUILD	9,963	Admin		MZ
751	AC PTS & TOE ST	9,834	Admin & Supply		Res. Furn (Htg & Clg) / UHs
810	ADMIN & SUPPLY BLDG	15,152	Admin & Supply		Dual Temp. FCs / H&V
812	ADMIN & SUPPLY BLDG	23,559	Admin & Supply		Dual Temp. FCs / H&V
835	MAF OPS BLDG	19,470	Admin & Supply		VAV / UHs / Flr. Slab Rad.
7212	CO HQ BLDG	19,320	Admin & Supply		Dual Temp. FCs / H&V
7220	CO HQ BLDG	18,870	Admin & Supply		Dual Temp. FCs / H&V
7243	ADMIN & SUPPLY BLDG	17,829	Admin & Supply		Win. AC / P. Rad. / FCs in building addition
7432	ADMIN & SUPPLY BLDG	13,500	Admin & Supply		Dual Temp. FCs / H&Vs
7602	ADMIN & SUPPLY BLDG	13,520	Admin & Supply		SZs (Clg Only) / P. Rad. (All)
7608	ADMIN & SUPPLY BLDG	13,520	Admin & Supply		SZs (Clg Only) / P. Rad. (All)
7652	ADMIN & SUPPLY BLDG	13,520	Admin & Supply		SZs (Clg Only) / P. Rad. (All)
7658	ADMIN & SUPPLY BLDG	13,520	Admin & Supply		SZs (Clg Only) / P. Rad. (All)
7802	ADMIN & SUPPLY BLDG	13,280	Admin & Supply		Dual Temp. FCs / H&Vs
7808	ADMIN & SUPPLY BLDG	13,280	Admin & Supply		Dual Temp. FCs / H&Vs
7852	ADMIN & SUPPLY BLDG	13,280	Admin & Supply		Dual Temp. FCs / H&Vs

Table 2-2. Building Groups for Computer Simulations

BLDG NO.	BLDG NAME	SQ FT	USE	COMP MODEL	HVAC SYSTEM TYPE
7858	ADMIN & SUPPLY BLDG	13,280	Admin & Supply		Dual Temp. FCs / H&Vs
8021	ADMIN & SUPPLY BLDG	23,676	Admin & Supply	X	Dual Temp. FCs / H&Vs
8023	ADMIN & SUPPLY BLDG	23,676	Admin & Supply		Dual Temp. FCs / H&Vs
8057	ADMIN & SUPPLY BLDG	23,676	Admin & Supply		Dual Temp. FCs / H&Vs
8059	ADMIN & SUPPLY BLDG	23,676	Admin & Supply		Dual Temp. FCs / H&Vs
29	RED CROSS BLDG	3,000	Admin - block		Res. Furn.
200	ADMIN GENERAL PURP	60,690	Admin - block		Water Source Heat Pumps
203	CAVALRY MUSEUM	5,800	Admin - block		SZs
205	CAVALRY MUSEUM	16,496	Admin - block		SZs / FCs
207	CAVALRY MUSEUM	8,278	Admin - block		SZs
210	MILIT PERS BLDG	58,448	Admin - block		MZ / VAV / SZ
211	ADMIN	41,062	Admin - block		SZ / CRU / P. RAD.
222	ADMIN GEN PURP	18,854	Admin - block		Win. ACs / P. Rad. / SZ
301	FINANCE ADMIN	32,947	Admin - block		VAV w/ Reheat
302	FINANCE ADMIN	16,138	Admin - block		VAV w/ Reheat
330	PW ADMIN	14,913	Admin - block		Res. Furn.
364	UEMCS HQ	744	Admin - block		Win. AC / Res. Furn.
403	ADM GENERAL	18,151	Admin - block		Water Source Heat Pumps
405	ADMIN GEN PURP	10,778	Admin - block		Dual Temp. FCs
406	CID BLDG	10,390	Admin - block	X	MZ
500	POST HQ BLDG	65,453	Admin - block		Water Source Heat Pumps
509	ADM GEN PURPOSE	10,108	Admin - block		Water Source Heat Pumps
610	ENL BARRACKS W/AS	29,004	Barracks		MZ / P. Rad.
620	OFF QTRS MILIT	12,640	Barracks		FCs (Htg) / Win. AC Units
621	OFF QTRS TRANS	10,723	Barracks		FCs (Htg) / Win. AC Units
5309	GUEST HOUSE	23,784	Barracks		Dual Temp. FCs
7050	ENL BARRACKS W/AS	39,675	Barracks & Dining		Dual Temp. FCs / H&V / SZ
7053	ENL BARRACKS W/AS	39,675	Barracks & Dining		Dual Temp. FCs
7404	ENL BARRACKS W/O DIN	50,967	Barracks		MZs / P. Rad.
7424	ENL BARRACKS W/O DIN	50,967	Barracks		MZs / P. Rad.
7610	ENL BARRACKS W/AS	41,892	Barracks		Dual Temp. FCs / SZs
7612	ENL BARRACKS W/AS	41,892	Barracks		Dual Temp. FCs / SZs
7614	ENL BARRACKS W/AS	41,892	Barracks		Dual Temp. FCs / SZs
7616	ENL BARRACKS W/AS	41,892	Barracks		Dual Temp. FCs / SZs
7618	ENL BARRACKS W/O DIN	41,892	Barracks	X	MZs
7642	ENL BARRACKS W/O DIN	41,892	Barracks		MZs
7644	ENL BARRACKS W/O DIN	41,892	Barracks		MZs
7646	ENL BARRACKS W/O DIN	41,892	Barracks		MZs

Table 2-2. Building Groups for Computer Simulations

BLDG NO.	BLDG NAME	SQ FT	USE	COMP MODEL	HVAC SYSTEM TYPE
7648	ENL BARRACKS W/O DIN	41,892	Barracks		MZs
7650	ENL BARRACKS W/O DIN	41,892	Barracks		MZs
7810	ENL BARRACKS W/O DIN	41,843	Barracks		Dual Temp. FCs / SZs
7812	ENL BARRACKS W/O DIN	41,843	Barracks		Dual Temp. FCs / SZs
7814	ENL BARRACKS W/O DIN	41,843	Barracks		Dual Temp. FCs / SZs
7816	ENL BARRACKS W/O DIN	41,843	Barracks		Dual Temp. FCs / SZs
7818	ENL BARRACKS W/O DIN	41,843	Barracks		Dual Temp. FCs / SZs
7842	ENL BARRACKS W/AS	41,843	Barracks		Dual Temp. FCs / SZs
7844	ENL BARRACKS W/O DIN	41,843	Barracks		Dual Temp. FCs / SZs
7846	ENL BARRACKS W/AS	41,843	Barracks		Dual Temp. FCs / SZs
7848	ENL BARRACKS W/O DIN	41,843	Barracks		Dual Temp. FCs / SZs
7850	ENL BARRACKS W/AS	41,843	Barracks		Dual Temp. FCs / SZs
8002	ENL BARRACKS W/O DIN	22,700	Barracks		Dual Temp. FCs
8006	ENL BARRACKS W/O DIN	22,700	Barracks		Dual Temp. FCs
8008	ENL BARRACKS W/O DIN	11,549	Barracks		Dual Temp. FCs
8012	ENL BARRACKS W/O DIN	22,700	Barracks		Dual Temp. FCs
8014	ENL BARRACKS W/O DIN	11,549	Barracks		Dual Temp. FCs
8038	ENL BARRACKS W/O DIN	22,700	Barracks		Dual Temp. FCs
8040	ENL BARRACKS W/O DIN	11,549	Barracks		Dual Temp. FCs
8042	ENL BARRACKS W/O DIN	22,700	Barracks		Dual Temp. FCs
8048	ENL BARRACKS W/O DIN	11,549	Barracks		Dual Temp. FCs
8050	ENL BARRACKS W/O DIN	11,549	Barracks		Dual Temp. FCs
8052	SR ENL QTRS	22,700	Barracks		Dual Temp. FCs
8054	ENL BARRACKS W/O DIN	11,549	Barracks		Dual Temp. FCs
27	OFF QTRS MILIT	38,146	Barracks - block		Heat Pumps
214	ENL BARRACKS W/AS	35,821	Barracks - block		MZs
223	ENL BARRACKS W/DAS	47,794	Barracks - block		MZs
227	ENL BARRACKS W/AS	32,303	Barracks - block		MZs
402	ENL BARRACKS W/AS	35,718	Barracks - block		MZs
404	ENL BARRACKS W/DAS	35,718	Barracks - block		VAVs
409	ENL BARRACKS W/AS	32,883	Barracks - block	X	MZs
410	ENL BARRACKS W/AS	32,883	Barracks - block		MZs
411	ENL BARRACKS W/AS	32,883	Barracks - block		MZs
512	SR ENL QTRS	13,619	Barracks - block		Dual Temp. FCs
540	OFF QTRS MILIT	14,528	Barracks - block		Dual Temp. FCs
541	OFF QTRS MILIT	18,083	Barracks - block		Dual Temp. FCs
542	OFF QTRS MILIT	14,528	Barracks - block		Dual Temp. FCs
760	BN HQ BLDG	7,364	Battalion		Stm. P. Rad.

Table 2-2. Building Groups for Computer Simulations

BLDG NO.	BLDG NAME	SQ FT	USE	COMP MODEL	HVAC SYSTEM TYPE
802	BN ADMIN & CLRM	12,526	Battalion		MZs
808	BN ADMIN & CLRM	12,526	Battalion		MZs
7017	BN HQ BLDG	2,604	Battalion		Res. Furn.
7028	BN CLASSROOMS	3,733	Battalion		Dual Temp. FCs
7046	BN CLASSROOMS	3,733	Battalion		Dual Temp. FCs
7031	BN HQ BLDG	3,733	Battalion		Dual Temp. FCs
7033	BN HQ BLDG	4,083	Battalion		SZ
7047	BN HQ BLDG	3,733	Battalion		Dual Temp. FCs
7048	BN HQ BLDG	2,604	Battalion		Dual Temp. FCs
7108	BN ADMIN & CLRM	12,527	Battalion	X	MZ
7109	BN ADMIN & CLRM	13,535	Battalion		VAV w/ Reheat
7215	BN HQ BLDG	2,604	Battalion		SZ / P. Rad.
7218	BN HQ BLDG	12,625	Battalion		MZ
7270	BN HQ BLDG	6,130	Battalion		MZ
7410	BN ADMIN & CLRM	12,599	Battalion		VAV w/ Reheat
7620	BN ADMIN & CLRM	6,340	Battalion		MZ / P. Rad.
7622	BN ADMIN & CLRM	12,380	Battalion		MZ / P. Rad.
7624	BN ADMIN & CLRM	6,158	Battalion		MZ / P. Rad.
7630	BN ADMIN & CLRM	6,158	Battalion		MZ / P. Rad.
7638	BN ADMIN & CLRM	6,158	Battalion		MZ / P. Rad.
7806	BN HQ BLDG	13,493	Battalion		SZs
7820	BN ADMIN & CLRM	6,673	Battalion		SZ
7824	BN ADMIN & CLRM	12,246	Battalion		MZs
7836	BN ADMIN & CLRM	12,246	Battalion		MZs
7854	BN HQ BLDG	13,493	Battalion		SZs
8025	BN ADMIN & CLRM	12,000	Battalion		MZs / P. Rad.
8037	BN ADMIN & CLRM	12,000	Battalion		MZs
5302	POST OFFICE	12,240	Post Office		MZ / P. Rad.
5315	MORRIS HILL CHAPEL	19,748	Church		SZ / FCs
7086	UNIT CHAPEL	8,696	Church	X	SZ / FCs
7865	UNIT CHAPEL	8,718	Church		SZ / Win. AC Units
3	POST CHAPEL	8,828	Church - block		SZ / H&V
6	POST CHAPEL	6,230	Church - block	X	SZs / P. Rad.
253	DRUG ABUSE CTR	11,122	Clinic		SZs
602	DENTAL CLINIC	11,557	Clinic		DD
814	MEDICAL FAC - NEW	9,220	Clinic		MZ
4010	DENTAL CLINIC	15,587	Clinic		DD
7034	CLINIC W/O BEDS	3,842	Clinic		MZ

Table 2-2. Building Groups for Computer Simulations

BLDG NO.	BLDG NAME	SQ FT	USE	COMP MODEL	HVAC SYSTEM TYPE
7626	CLINIC W/O BEDS	3,604	Clinic		MZ
7665	DENTAL CLINIC	11,076	Clinic	X	MZ
7670	DENTAL CLINIC	14,960	Clinic		DD
7826	CLINIC W/O BEDS	3,841	Clinic		MZ
8065	CLINIC W/O BEDS	3,848	Clinic		MZ
650	COLD STOR FAC	22,331	Cold Storage		Unit Coolers
652	COLD STOR FAC	8,167	Cold Storage		Unit Coolers
7245	ENL PERS DIN	13,998	Dining		SZs / H&Vs
7606A	ENL PERS DIN (Dining Area)	8,995	Dining	X	SZs
7606B	ENL PERS DIN (Kitchen Area)	4,498	Dining	X	H&Vs
7654	ENL PERS DIN	13,493	Dining		SZs / H&Vs
7804	ENL PERS DIN	13,493	Dining		SZs / H&Vs
7856	ENL PERS DIN	13,493	Dining		SZs / H&Vs
8063	ENL PERS DIN	18,313	Dining		MZ
723	MNT HANGAR COMB	21,640	Hangar		Flr. Slab Rad. / UHs / P. Rad.
727	MNT HANGAR COMB	36,152	Hangar		SZ / MZ / UHs
741	MNT HANGAR COMB	38,898	Hangar		UHs
817	MNT HANGAR AVUM	40,061	Hangar		Flr Slab Rad. / H&V / HCU
833	AIRCRAFT HANGAR	52,080	Hangar		Flr Slab Rad. / H&V / VAV / HCU
853	MNT HANGAR AVUM	48,112	Hangar		Flr Slab Rad. / Gas-Fired H&V / UHs
710	TAC EQUIP SHOP	2,173	Maintenance		SZ / UHs
820	TAC EQUIP SHOP	20,564	Maintenance		SZ / UHs / P. Rad.
840	VEHICLE MNT SHOP ORG	9,152	Maintenance		H&V / SZ / MAU / Win. AC Units / P. Rad. / IR Heaters
1470	AR VEH MNT SHOP	21,667	Maintenance		UHs / SZ / MAU / P. Rad.
7176	MOTOR POOL MNT SHOP	4,880	Maintenance		UHs
7350	VEH MNT SHOP ORG	21,345	Maintenance		Res. Furn. / MAU / Gas Fired IRs
7500	VEH MNT SHOP ORG	22,325	Maintenance		MAUs / Res. Furn. / Gas Fired IRs
7520	VEH MNT SHOP ORG	27,112	Maintenance		MAUs / Res. Furn. / Gas Fired IRs
7760	VEH MNT SHOP ORG	17,163	Maintenance		MAUs / Res. Furn. / Gas Fired IRs
7720	VEH MNT SHOP ORG	22,325	Maintenance		MAUs / Res. Furn. / Gas Fired IRs
7780	VEH MNT SHOP ORG	17,163	Maintenance		MAUs / Res. Furn. / Gas Fired IRs
7900	VEH MNT SHOP ORG	20,943	Maintenance		MAUs / Res. Furn. / Gas Fired IRs
7920	VEH MNT SHOP DS	124,553	Maintenance		Res. Furn. w/ HC / UHs / SZ / MAU
7940	VEH MNT SHOP ORG	22,405	Maintenance		MAUs / Res. Furn. / Gas Fired IRs

Table 2-2. Building Groups for Computer Simulations

BLDG NO.	BLDG NAME	SQ FT	USE	COMP MODEL	HVAC SYSTEM TYPE
7960	VEH MNT SHOP ORG	20,245	Maintenance		MAUs / Res. Furn. / Gas Fired IRs
8100	CONSOLIDATED MNT	224,927	Maintenance		Roof SZs / HRUs
8300A	VEH MNT SHOP ORG	20,240	Maintenance	X	Res. Furn. / Gas Fired IRs
8300B	VEH MNT SHOP ORG	20,240	Maintenance	X	MAUs
8320	VEH MNT SHOP ORG	20,240	Maintenance		MAUs / Res. Furn. / Gas Fired IRs
8330	VEH MNT SHOP ORG	39,256	Maintenance		UHs / H&Vs / MAU
8340	VEH MNT SHOP ORG	20,240	Maintenance		MAUs / Res. Furn. / Gas Fired IRs
8360	VEH MNT SHOP ORG	39,428	Maintenance		H&V / UHs / MAU / Win. AC Units / Gas IR Heaters
8370	VEH MNT SHOP ORG	26,876	Maintenance		SZ / H&V / MAU
8380	VEH MNT SHOP ORG	73,400	Maintenance		Gas Fired SZ / H&V / MAU / Gas IR Heaters
8390	TAC EQUIP SHOP	24,755	Maintenance		H&V / MAU / UHs
8410	VEH MNT SHOP ORG	73,233	Maintenance		Gas Fired SZ / H&V / MAU / Gas IR Heaters
1980	RECYCLE CENTER	24,968	Maintenance		Res. Furn. / H&V
806	COMB AC-HTG PLANT	1,000	Mechanical		HW Boilers and Chillers
7210	CH CHILLER PLANT	4,320	Mechanical		Chillers
8073	CH ENERGY PLANT	4,070	Mechanical		Steam Boilers and Chillers
202	PHYS FITNESS CTR	51,307	Gym - block		SZ / UHs
5800	YOUTH CTR	21,560	Youth Center		SZ / MZ
6940	INDOOR SWIM POOL	23,347	Swimming Pool		H&V / SZ
7024	GYMNASIUM	20,619	Recreation		H&V / FCs
7632	GYMNASIUM	20,694	Recreation		H&V / FCs
7832	GYMNASIUM	20,694	Recreation		H&V / UHs
8069A	IN SW POOL/GYM	6,600	Swimming Pool	X	H&Vs
8069B	IN SW POOL/GYM	19,020	Gymnasium / Lockers	X	H&V / SZ
6910	EXC SP ST FAC	2,525	Retail		Res Furn.
6914	EXC MAIN RETL	63,930	Retail	X	SZ / MZ
7285	CLOTHING SALES	17,042	Retail		SZ w/ Booster Coils
720	AF OPS BLDG	3,705	Simulator		Res. Furns.
722	FLIGHT SIMULATOR	7,000	Simulator		SZs / VAV
724	FLIGHT SIMULATOR	13,188	Simulator	X	MZ / SZ / CRU / P. Rad.
7739	MOVING TARGET SIM BLDG	4,074	Simulator		MZ / FCs
7485	BOWLING ALLEY	36,966	Recreation	X	DD / VAV
7866	THEATER W/DRESS RM	11,098	Theater	X	SZ
206	THEATER W/O DRESS RM	10,754	Theater		SZ
319	GEN INSTRUCTION BLDG	9,690	Training		SZ / P. Rad.

Table 2-2. Building Groups for Computer Simulations

BLDG NO.	BLDG NAME	SQ FT	USE	COMP MODEL	HVAC SYSTEM TYPE
6620	COMMUN ACT CTR	31,740	Training		SZ / H&V
6918	SKILL DEV CTR	11,507	Training		Roof Top SZs / Res. Furn
7264	LIBRARY MAIN	31,240	Training		SZ / P. Rad
7305	APP INSTR BLDG	9,872	Training		Res. Furn. w/ AC
7604	GEN INST BLDG	1,346	Training		MZs
7656	GEN INST BLDG	13,493	Training	X	MZs
8044	APP INSTR BLDG	2,470	Training		Res. Furn.
			TOTAL NUMBER OF COMPUTER MODELS	21	

Two buildings were dropped from the analysis. These buildings and the reasons they were eliminated include:

- Building 615, IACH Energy Plant - provides heating and cooling to Irwin Army Hospital, Building 600. A UMCS is currently scheduled to be installed in the hospital, and will also be extended to Building 615.

- Building 1980, Recycle Center - not a viable candidate for UMCS control or monitoring. It is a temorary building and World War II vintage. Building 1980 is currently scheduled for demolition.

2.3 ENERGY SOURCES AND CONSUMPTION

2.3.1 Electricity

Fort Riley is served by two electrical substations. The substations are named ANZIO and IRWIN. The electrical energy consumption and electrical demand are metered at these substations. Historical electrical energy and demand use and cost data for fiscal year (FY) 1994 was obtained from billing records at Fort Riley. The electrical power is provided by the Western Resources, Inc. utility company.

The Table 2-3 below presents the historical data for FY94 electrical energy consumption and electrical demand metered at the substations ANZIO and IRWIN.

Table 2-3. Historical Data for Electrical Consumption

FY 94	Electrical Demand (kW)	Electrical Demand Cost ($)	Electrical Consumption (kWh)	Electrical Cost ($)[1]
Oct-93	23,799	119,643	11,661,143	502,123.81
Nov-93	29,089	119,396	12,536,771	528,971.54
Dec-93	25,479	119,396	14,417,197	582,900.16
Jan-94	28,540	119,396	14,355,290	581,163.81
Feb-94	31,095	121,548	13,342,753	555,176.05
Mar-94	23,364	119,396	12,487,960	527,368.73
Apr-94	24,630	119,396	11,933,772	510,329.98
May-94	32,014	124,219	12,540,938	534,751.57
Jun-94	35,469	137,619	16,953,600	681,156.51
Jul-94	35,750	138,670	16,754,188	676,879.49
Aug-94	35,489	134,668	17,613,148	700,115.86
Sept-94	33,945	131,703	14,756,495	609,992.09
Totals	358,663	1,505,050	169,353,256	6,990,929.62
Electrical Demand Unit Cost is calculated using a demand limiting computer spread sheet provided by the Fort Riley Public Works Energy Branch			Electrical Energy Unit Cost	$0.0413 / kWh $12.10 / MBtu

The unit cost of electricity used in the analysis is $12.10 per MBtu. The unit cost for electrical demand used in the analysis is $25.48 per kW per year. The electrical demand unit cost was calculated using a demand limiting computer spread sheet. A review of the total electrical demand savings for the proposed UMCS revealed that an estimated reduction of 7,600 kW was possible. The 7,600 kW was entered into the demand limiting computer spread sheet as an annual reduction. The total annual dollar savings were calculated to be $193,671. The dollar savings were divided by 7,600 kW to determine the cost of $25.48 per kW per year. The demand limiting computer spread sheet is presented in Appendix C.

2.3.2 Natural Gas

Historical data for natural gas consumption was obtained from billing records at Fort Riley. Table 2-4 below presents the natural gas consumption, cost data for FY94, and the unit cost of natural gas.

Table 2-4. Historical Data for Natural Gas Consumption

FY 94	Natural Gas Consumption (MBtu)	Natural Gas Unit Price	Total Natural Gas Cost
Oct 93	70,695	$3.88	$274,296.60
Nov 93	150,142	$4.08	$612,579.36
Dec 93	186,439	$4.54	$846,433.06
Jan 94	233,073	$4.19	$976,575.87
Feb 94	199,962	$4.37	$873,833.94
Mar 94	130,497	$4.38	$571,576.86
Apr 94	85,400	$3.96	$338,184.00
May 94	36,474	$3.98	$145,166.52
Jun 94	39,047	$3.18	$124,169.46
Jul 94	39,483	$3.32	$131,083.56
Aug 94	37,667	$3.24	$122,041.08
Sep 94	35,304	$3.06	$108,030.24
Totals	1,244,183		$5,123,970.55
		Unit Cost of NG	$4.12 / MBtu

2.4 FIELD SURVEY OBSERVATIONS

2.4.1 Existing Controls

A field survey was conducted in 214 buildings for the purpose of installing a UMCS on the HVAC systems. The typical HVAC systems observed during the field survey are listed below:

- Air handling Units
- Fan Coil Units
- Unit Heaters
- Heat Pumps
- Water Chillers
- Cooling Towers
- Air Cooled Condensing Units
- Steam Boilers
- HW Boilers
- Steam-to-HW Converters
- DTW Pumps
- HW Pumps
- CW Pumps

A visual inspection of the existing controls was conducted to determine their overall condition and functionality. Generally, the mechanical rooms, the HVAC systems, and the existing controls are in fair condition. The maintenance shops are implementing scheduled maintenance of equipment and controls. However, some of the HVAC systems were observed to have damaged or missing components. Some of the components damaged or missing are noted as follows:

- Timeclocks are installed but the start/stop pins have been removed.
- Outside air damper settings on fan systems seem to vary greatly.
- Pneumatic tubing on 2-way and 3-way control valves has been cut or disconnected.
- HVAC controls have been completely removed from some of the systems.
- Some barracks are overheating, causing enlisted personnel to open windows to control temperature.

Field survey forms were used to record the field survey observations, including building occupancy schedules, HVAC system name plate data, and existing controls information. The field survey forms are presented in a separately bound volume of the report designated Field Survey Data.

2.4.2 Existing Johnson Controls JC/85/40 EMCS

Fort Riley has an existing Johnson Controls JC/85/40 EMCS connected to 23 buildings. The JC/85/40 EMCS, located in Building 364, was installed in 1985. The EMCS has a central operator station that includes a TI 112 CPU with a 40 megabyte hard drive, a cartridge tape data storage, a color monitor, a TI terminal printer, two dot matrix printers, and telephone modems. The EMCS has three work stations each consisting of a monitor, a telephone modem, and a dot matrix printer. The work stations are located in Bldg. 600 - Irwin Army Hospital, Bldg. 615 - IACH Energy Plant, and Bldg. 8073 - Central Plant at Custer Hill. Figure 2-1 on page 2-15 presents a block diagram of the existing JC/85/40 EMCS.

Discussions with the EMCS operators at Fort Riley regarding the existing JC/85/40 EMCS indicated the system was operational and providing them with utility savings. Specific problem areas discussed include:

- Telephone lines need significant bridging and conditioning in order to function properly.
- Field Processing Units (FPUs) will stay in the last command mode if the EMCS looses communication with it. If the system being controlled is off at the time of

communication loss, it will stay off until a site visit is made and the FPU command is overridden.

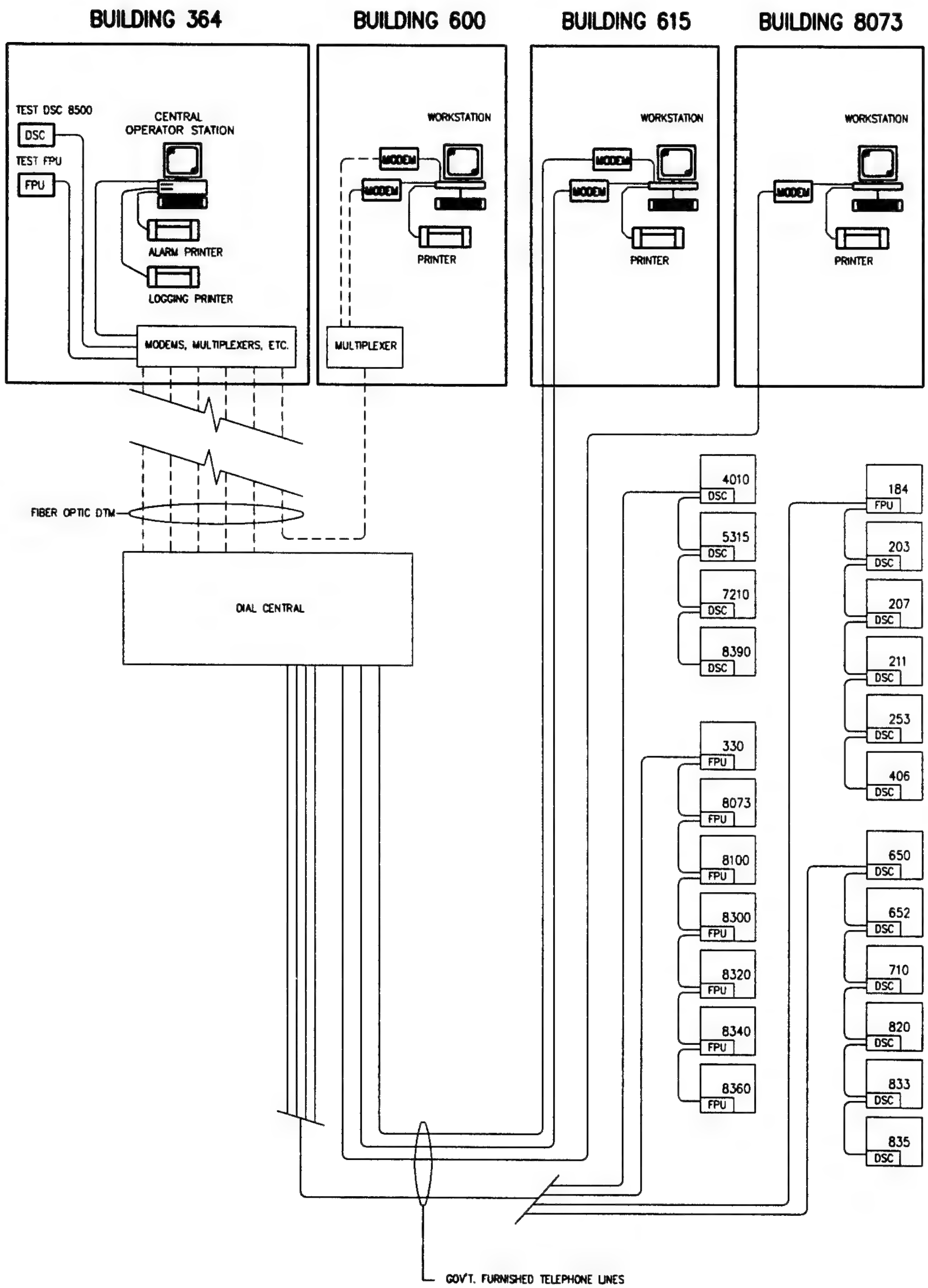


FIGURE 2–1. EXISTING EMCS

3. UTILITY MONITORING AND CONTROL SYSTEM APPLICATION

3.1 GENERAL

An UMCS function is a specific action performed by control software. An UMCS can be programmed to monitor and control several tasks. The name, method, and implementation approach for any particular task varies with the individual UMCS manufacturer. Variations generally depend on the particular software or hardware used by a manufacturer to accomplish each function, rather than on the task itself.

3.2 ENERGY CONSERVING UMCS FUNCTIONS

The energy conserving UMCS functions evaluated in this feasibility study include:

- Scheduled start/stop
- Optimum start/stop
- Duty cycling
- Demand limiting start/stop
- Night setback
- Ventilation/recirculation damper control
- Economizer
- Direct digital control
- Hot water outside air temperature reset
- Chilled water temperature reset.

These functions are utilized in DDC control of HVAC equipment, such as fan and pump motors, heating and cooling coils, dampers, VAV boxes, steam-to-hot water converters, boilers, and chillers. The DDC control will be accomplished by replacing local loop controls with direct control output from the UMCS. The UMCS functions listed above are described individually in Appendix B. They represent the common functions applicable at Fort Riley. Not all of the UMCS functions evaluated in this study provide sufficient energy savings to justify their usage. The UMCS functions applicable to each system are presented in the I/O summary tables in Appendix D.

3.3 UMCS MONITORING FUNCTIONS

In addition to the energy conserving UMCS functions listed in Section 3.2, the UMCS can monitor the operational status and operational parameter values for buildings, HVAC equipment, and utilities. Data on monitored parameters may be gathered and presented to the UMCS operator in either digital or analog form. An analog monitoring point could be

represented as a critical space temperature; i.e., the operator could read the actual temperature in the space at any time desired, with the UMCS programmed to signal the operator when the temperature goes outside of the programmed limits. Digital monitoring points can be characterized as an On-or-Off status indication or as an alarm signaled to the UMCS operator as the result of an alarm contact closure.

The monitoring capabilities of the UMCS will assist maintenance personnel by indicating alarm conditions, facilitating remote trouble-shooting, and generating reports to assist in scheduling equipment maintenance. This feature would be expected to be a valuable tool for maintenance personnel at Fort Riley. Theoretically, it would reduce the cost of maintenance operations by allowing more time for general service call maintenance work, and reduce crisis maintenance. It is unlikely a reduction in maintenance staff would result from this feature.

The following UMCS monitoring functions are recommended for the UMCS at Fort Riley. These functions are also described in Appendix B:

- Run-time reports
- Temperature monitoring
- Status condition monitoring
- Energy metering.

The UMCS should be specified with a report generator having a number of standard reports, plus custom report generating capabilities. These reports provide the UMCS operators and maintenance personnel with valuable data for operating the UMCS, along with monitoring HVAC systems and building conditions. The standard reports specified for the UMCS include:

- Status report
- Correlated alarm report
- Profile report
- Electrical power utilization report
- Energy utilization report
- Energy savings report
- Alarm report
- Lockout report
- Analog limit report
- Run-time report
- Cooling tower profile report
- Electrical peak demand prediction report
- Chiller utilization report
- Optimum start/stop report
- Out-of-service report
- Static data base report
- Real-time data base report

4. UTILITY MONITORING AND CONTROL SYSTEM REQUIREMENTS

4.1 GENERAL

Fort Riley has various alternatives for future UMCS expansion. Three alternative UMCS configurations were evaluated in this study at the Interim Submittal. Alternative 1 discussed replacement of the existing JC/85/40 EMCS with a new JC Metasys UMCS via implementing a sole source contract for the UMCS. The evaluation investigated the possibility of a higher contract cost for material and labor due to implementing a sole source contract. Alternative 2 discussed installation of a new UMCS in parallel with the existing JC/85/40 EMCS, thus ending up with two separate control systems for the buildings evaluated. Alternative 3 discussed installation of a new UMCS for the buildings evaluated in the study, replacing the existing JC/85/40 EMCS.

Alternative 1 was evaluated to introduce the potential results of implementing a sole source contract for the UMCS without a competitive bidding environment. Based on the discussion at the Interim Submittal review conference, this alternative was eliminated from the study.

Alternative 2 was evaluated to investigate the possibility of reusing the existing EMCS. The existing EMCS is currently used to its capacity and is ten year old technology. A new UMCS is recommended to provide better and more reliable control, therefore, this alternative was eliminated from the study.

Alternative 3, the installation of a new UMCS, is recommended and the evaluation is presented in this study as the proposed UMCS.

The proposed UMCS would replace the existing JC/85/40 EMCS and include new buildings which are economically feasible on the UMCS. The following items were evaluated:

- Install new front-end computer equipment for new UMCS.
- Install new field panels, UMCS points, and control wiring in the existing 23 buildings and new buildings.
- Install FO DTM to existing and new buildings.
- Install new software and provide programming for the data base and control sequences.

4.2 CONFIGURATIONS

The current UMCS configuration, based on the Huntsville Division Corps of Engineers current draft guide specifications, includes the following main components:

- Remote Control Units (RCU)
- Auxiliary Control Units (ACU)
- Unitary Control Units (UCU)
- Central Operator Station (COS)
- Communication Processor
- Communication Network Interface.

The UMCS is based around PC-based front-end computers, specified to be the fastest available microprocessor at the time (currently an Intel 80586-120 MHz).

The RCU is the next level down in the system architecture. The RCU is a microprocessor-based field panel which coordinates communications and some high level control coordination with ACUs and UCUs. For a design basis, there is typically one RCU per 500 UMCS points.

The ACUs and UCUs are also micro-processor based panels, but are generally set up to control and monitor single pieces of equipment, or groups of equipment. The ACU would normally be used for large systems, and UCUs would be used for terminal devices (such as VAV boxes and fan coils).

The communication processor and network interface provide the interface and management of networks. Depending on the vendor, different networks could exist between COSs, between the COS and RCUs, and between the RCUs, ACUs, and UCUs. Because the Corps of Engineers is currently changing the configurations and specifications, no further detail will be specified at this point. Where new RCUs, ACUs, and UCUs are installed, a minimum of 10% spare capacity should be provided for future use.

Any new UMCS should be a PC-based system, with RCU, ACU, and UCU system architecture.

Sensed data should be obtained from the RCUs, ACUs, and UCUs, collectively referred to as control units (CUs), which are located near the data environment monitored and controlled by the UMCS. The CUs should monitor and control all aspects of their data environments not requiring coordination with the COS. Failure procedures should be provided to automatically switch the system to manual operation in the event of a CU failure.

Hardware and configuration requirements are currently changing. If the project is funded for construction, the overall descriptions of hardware and configuration should be revised and updated as necessary to meet the most up-to-date criteria and specifications.

4.3 DATA TRANSMISSION MEDIA

An underground fiber optic (FO) data transmission media (DTM) system is recommended as the communications media for building-to-building data transmission for the Fort Riley UMCS. The existing EMCS utilizes a combination of telephone line pairs and FO DTM. The Directorate of Information Management group (DOIM) indicated that the existing FO network in the Main Post area is scheduled to be upgraded with new FO cable within the next year. A new FO network is also currently being designed and installed in the Main Post and Custer Hill areas at Fort Riley. The availability of the new FO cable network for use in the new UMCS is uncertain. For this reason, new FO cable was estimated for the installation of the UMCS. The estimate includes the use of some existing underground FO conduit for pulling the new FO cable.

FO systems present a unique solution to UMCS data transmission, a solution other media cannot provide as well or as reliably. In FO cables, signals are transmitted in the form of energy packets which have no electrical charge. Consequently, it is physically impossible for high electric fields (lightning and high-voltage) or large magnetic fields (heavy electrical machinery, transformers, and generators) to affect the data transmission.

A number of factors favor the use of FO DTM for UMCS and control applications:

- Elimination of ground loops and common mode voltages. This results in the following advantages:
  - ◊ Elimination of electromagnetic interference (EMI) emissions which generate "noise."
  - ◊ Immunity to electromagnetic, radio frequency, and electrical pulse interference.
  - ◊ Elimination of cross-talk.
- Safety in explosive or flammable environments.
- Capability of carrying much more information than can be carried in copper conductors.
- Fewer electrical code limitations.
- Security of information.
- Reduction in weight and size in comparison to wire cable.
- Cost effectiveness.

In addition, properly cabled optical fibers can tolerate most kinds of weather and can, without ill-effect, be exposed to polluted air or immersed in many fluids, including water. Though the FO cables themselves are not susceptible to noise, FO equipment such as transceivers and modems are susceptible to noise and should therefore be located away from EMI sources.

A basic FO transmission system consists of a transmitter, a FO cable, and a receiver. Electrical information in digital or analog form is input to the transmitter, which converts it into an optical signal and outputs via a light emitting diode (LED) or injection lasers. The information, in light form, is then transmitted over the FO cable to a receiver. The receiver typically consists of a photodetector, amplifier, and demodulator.

4.4 SENSORS AND ACTUATORS

Sensors and actuators should be provided to monitor and control all remote points of the UMCS as indicated on the I/O summary tables. The sensors should include, but not be limited to, the following:

- Temperature sensors with transmitters
- Relative humidity sensors with transmitters
- Pressure sensors
- Pressure switches
- Watt meters
- Amp meters
- Flow meters
- Current transformers
- Status relays
- Start/stop control relays
- Electric/pneumatic transducers
- Pneumatic/electric transmitters.

4.5 UMCS OPERATIONS AND MAINTENANCE

4.5.1 UMCS Operations

The existing EMCS at Fort Riley is currently operated and maintained by trained EMCS operators. Additional training for the EMCS operators will be required to operate and maintain the proposed UMCS. UMCS operators should be familiar with the proposed UMCS hardware and software and be able to maintain and troubleshoot the new system.

4.5.2 UMCS Maintenance

Accurate and continuous maintenance of UMCS equipment is essential if the maximum benefits of the system are to be realized. Without proper maintenance, the reliability of an UMCS will rapidly deteriorate, thereby reducing its energy conservation capability and benefits. In an extreme case, the UMCS could fall into disuse as the confidence of operating personnel is lost.

Maintenance of the electronic equipment and software programs requires special technical training and experience. It is recommended that the decision to contract out maintenance or to perform maintenance in-house for this equipment be left to the Fort Riley Public Works. The first year and continuing annual maintenance cost is estimated to be equal to approximately 8% of the total field hardware material costs.

4.6 AUTHORITY

The recognition and authority of the personnel in-charge of the UMCS is an important consideration. Without the full backing of top level command, these personnel will have difficulty in effectively implementing the energy conserving capabilities of the UMCS.

The cost effectiveness of an UMCS depends on several factors, including:

- Training and motivation of operators to properly use a sophisticated UMCS.
- Coordination between UMCS operations and maintenance personnel, contractors, and others, to reduce wasted materials, labor, and duplication of effort.
- Basic training of maintenance personnel, to assure their activities do not excessively hinder UMCS operations. Education will enable maintenance personnel to use the UMCS in operating and maintenance (O&M) and utilities areas, thereby improving the overall cost effectiveness.
- High priority of funding for UMCS maintenance, in order to keep the system in good operating condition.
- Obtaining the proper level of maintenance for UMCS hardware and software.
- Periodic verification and validation of energy and O&M cost savings, to ensure the UMCS is performing as planned.

If successfully implemented, the UMCS can assist all O&M personnel in carrying out their missions. The UMCS can save energy, predict equipment failure, detect equipment failure quickly, and schedule preventive maintenance. There is significant potential for cost

avoidance at Fort Riley if UMCS administration, operations, and maintenance activities are properly planned and implemented, and the UMCS is used to its full capability.

4.7 REPAIR OF EXISTING CONTROLS

Some UMCS functions require an interface with existing local control devices, which must be in working order for the UMCS to function properly. Local control devices consist of starters, valve actuators, and various other local control components. Prior to the UMCS installation, the maintenance of the following items should be implemented on all existing systems:

- Safety control components, such as firestats, freezestats, smoke detectors, pressure controls, and temperature controls should be in proper working order.

- Fan belt alignment and tension should be checked on all systems.

- Starters should be checked for proper fuse or breaker size, overload protection, and proper operation.

- Control valves, damper actuators, and other equipment should be in proper working order.

- Outside air dampers should be repaired or replaced to ensure tight-fitting dampers.

In cases where new control devices are required, they should be included in the final design and provided by the UMCS contractor, if funded by O&M money. The cost to repair local controls is not included in the economic analysis. The repair cost was not included because these repairs are necessary maintenance with or without the UMCS.

5. ANALYSIS METHODOLOGY

5.1 PROCEDURES

A review of the building drawings was initially performed, noting the type of building construction, building location, and type of HVAC systems. A field investigation was then conducted to verify the accuracy of the drawings and to gather data on each of the HVAC systems. During this investigation, types of UMCS functions which might be applicable to each system were determined. Fort Riley building and maintenance personnel were asked about present methods of system operation, building occupancy schedules, and areas where UMCS control could cause potential difficulties.

A UMCS, when applied to large buildings and multi-building facilities, can be extensive and very complex. For this reason, cost-effective UMCS functions should be selected for connection to an ~~can be~~ extensive and complex UMCS. The proper selection of UMCS functions is essential if an UMCS is to provide optimum energy savings.

EMC Engineers, Inc., used a series of computer programs and analysis techniques to select the buildings, systems, and UMCS functions which would provide an optimum UMCS configuration for Fort Riley. A database computer program, written by EMC Engineers, Inc., was used to calculate the energy savings which result when a particular UMCS function is applied to a specific mechanical system type. Energy savings were calculated on a function-by-function basis for each HVAC system. The calculations follow the basic guidelines described in "CR 82.030, Standardized EMCS Energy Savings Calculations, Naval Civil Engineering Laboratory."

Energy savings were calculated using energy constants. An energy constant is a quantity of energy related to a specific building and HVAC system type. The energy constants used in the energy savings calculations were derived from computer energy simulations of representative buildings. The EZDOE computer program was used for the computer simulations. The EZDOE computer program can perform hourly energy calculations and predict the energy consumption for heating and cooling systems and various operational settings. For the buildings not simulated, energy savings were extrapolated from representative buildings using the energy constants. A detailed description of the algorithms used in the database computer program is presented in Appendix C. The representative buildings simulated using the EZDOE computer program are presented in Table 2-2 on page 2-8. The energy constant calculations and the computer simulation reports are presented in Appendix H.

The functions provided in the energy analysis program include:

- Scheduled start/stop
- Optimum start/stop
- Direct Digital Control
- Night Setback

- Duty Cycling
- Demand Start/Stop of Motors
- Demand Start/Stop of chillers
- Economizer control
- Hot Water outside Air Reset
- Chilled Water Temperature Reset
- Ventilation/Recirculation damper control

I/O summary tables were developed for each system and the proposed UMCS functions. Costs for system hardware points to implement the UMCS functions were estimated. These costs were divided appropriately between UMCS function groups and entered into the database computer program.

The Energy Conservation Investment Program (ECIP) guidance (dated January 1994) was used to evaluate the energy savings and economics in this study. To qualify for ECIP, an energy conservation opportunity (ECO) or a project must have a SIR greater than 1.25 and a Simple Payback less than 10 years.

The energy savings and costs, stored within the database computer program, were used to calculate the economics (SIRs and Simple Paybacks) for the various UMCS functions on a system-by-system basis. A summary table of the HVAC system economics is presented in Appendix F.

The energy savings and costs associated with the HVAC systems were summed for each building. A SIR and a Simple Payback were then calculated for each building. Buildings with an SIR greater than 1.25 were selected for the UMCS project. Buildings with an SIR less than 1.25 did not qualify, and were eliminated from the UMCS project.

5.2 I/O SUMMARY TABLES

Typical I/O summary tables were developed for the HVAC systems evaluated in this study. The I/O summary tables consist of:

- Applicable UMCS functions recommended for each HVAC system.
- Sensors and actuators required to accomplish the recommended UMCS functions.

The I/O summary tables generated for the UMCS feasibility study are meant to be as accurate as possible for depicting the proposed inputs and outputs for the final design. However, because the study uses typical system types for the analysis, the final system-by-system design may vary, depending on existing control configurations. The typical I/O summary tables are presented in Appendix D. A list of buildings and the HVAC systems that are applicable to the I/O summary tables is provided.

5.3 ENERGY SAVINGS

Energy savings were calculated for each UMCS function. UMCS functions not requiring an energy savings evaluation by computer simulation are as follows:

- Scheduled start stop
- Optimum start stop
- Duty cycle
- Demand limit
- HW OA reset
- Chilled water reset
- Chiller demand limit

The energy savings for these UMCS functions were calculated using system information (operating schedules, motor horse powers, etc.) and energy equations in the database energy program.

UMCS functions requiring an energy savings evaluation by computer simulation are as follows:

- Night setback
- DDC control
- Economizer control
- Ventilation-recirculation control

The 21 computer energy simulations for representative buildings were modified to evaluate energy savings for each of these UMCS functions. The energy savings were calculated by subtracting the UMCS function computer simulations from the baseline computer simulations. Interrelated UMCS functions were simulated in a manner which prevented duplication of energy savings. For example, night setback savings were calculated first, if applicable, then followed by UMCS functions such as DDC control, economizer control, and ventilation-recirculation control.

Energy savings from the computer simulations were entered into a computer spreadsheet to calculate energy constants for the representative building UMCS functions. The energy contants were then used in the energy savings equations in the database computer program to calculate energy savings for these UMCS functions.

Appendix C describes the energy constants and formulae used to calculate the energy savings. Appendix H contains the energy constant calculations spread sheets and the computer energy simulation input and output reports for the 21 representative buildings.

5.4 CONSTRUCTION COSTS

The construction cost was subdivided into ten categories. The ten categories are as follows:

- UMCS Software/Database
- UMCS Central Equipment
- Training
- Documentation and Submittals
- Testing
- Total Field Hardware
- Fiber Optic DTM
- ACM Removal
- Radio Frequency System for Remote Site Monitoring
- Fiber Optic DTM and Equipment for Monitoring Gas Utility Meters

The UMCS Software/Database and UMCS Central Equipment are UMCS front-end costs. The costs for these items were estimated using a COE cost estimating database. Additional Training for UMCS operators, Documentation and Submittals for UMCS installation and construction, and Testing for the UMCS configuration were also estimated using a COE cost estimating database.

The Total Field Hardware cost is comprised of unit costs for the field device points, RCU panels, ACU panels, and UCU panels. The field device points consist of control devices, sensors, actuators, and control wiring. The field device point costs and the field panel costs were derived from manufacturer's cost data.

The Fiber Optic DTM consists of fiber optic cable installed underground in a flexible polyethylene conduit. Costs for the fiber optic cable and the underground conduit were estimated using a COE cost estimating database and manufacturer's cost data.

The ACM Removal was estimated for building HVAC systems where suspect asbestos-containing materials (ACM) were visually observed during the field survey. The locations of suspect ACM on the HVAC systems and the types of UMCS points to be installed were evaluated. For each UMCS point to be installed where suspect ACM is located, the cost for the glovebag method of ACM removal was estimated.

The Radio Frequency System for Remote Site Monitoring was evaluated for electrical substation utility meters, gas utility meters, and Building 1470 at Camp Funston. This system was evaluated because the cost to install FO DTM to the remote meters and building sites was extremely high. The costs for the Radio Frequency System were derived from manufacturer's cost data.

The Fiber Optic DTM and Equipment for Monitoring Gas Utility Meters were evaluated for gas utility meters near the proposed routing of the FO DTM. Costs for the fiber optic cable

and the underground FO conduit were estimated using a COE cost estimating database. The UMCS field panel costs were derived from manufacturer's cost data.

The costs for the ten categories were summed and the contractor's costs for overhead, bond, and profit were added to the total. A contingency was added for any additional, unforseen costs. The first year and continuing annual maintenance cost of the UMCS was included and estimated to be equal to approximately 8% of the UMCS field hardware material cost. The cost estimates and cost data are presented in Appendix E.

5.5 UMCS PRIORITIZATION

The UMCS functions, HVAC systems, and buildings selected for this feasibility study were based on evaluation of simple payback and SIR.

The UMCS functions for scheduled start/stop, optimum start/stop, duty cycle, demand limit, and night setback were combined for the system economic analysis. These UMCS functions were evaluated together because they use common field hardware for UMCS control. The other UMCS functions (economizer, ventilation-recirculation, DDC, HW OA reset, chilled water reset, chiller demand limiting, and remote monitoring-safety alarms) were not combined, but were evaluated individually for the system economic analysis. This economic analysis is provided in order to evaluate whether some UMCS functions should be eliminated from a HVAC system. Some UMCS functions alone are not economically feasible, but when combined with other UMCS functions for the same HVAC system, the entire package of UMCS functions for a given HVAC system is economically feasible. The system economics table listing the building and system numbers is presented in Appendix F.

The UMCS functions for the HVAC systems per building were combined to determine the economic feasibility for each building. The building economic summary included costs for the remote panels (RCUs, ACUs, and UCUs) and the field device point costs. The buildings were then sorted based on descending SIR. The buildings with SIRs greater than 1.25 were included in the proposed UMCS. The building economic summary for the proposed UMCS evaluation is presented in Section 6.0.

5.6 UMCS EVALUATION

The following factors were included in the economic evaluation of the proposed UMCS discussed in Section 4.0.

- Costs for a new COS were included.

- Costs for replacing existing field panels and field device points with new were included.

- Costs for field panels and field device points were included for new buildings.
- Programming and testing costs were included for new points.
- Costs for new FO DTM between buildings were included.

6. RESULTS OF ANALYSIS

6.1 GENERAL

This section summarizes the results of the analysis performed for the HVAC systems in each of the 214 buildings included in this feasibility study. A summary of the energy savings for each building and a cost breakdown for the proposed UMCS configurations is provided.

6.2 BUILDING SUMMARY

The results of the building-by-building analysis for the proposed UMCS are summarized in Table 6-1, beginning on page 6-2. The savings and costs listed in this table include only those systems and UMCS functions which are recommended for the UMCS. The field panel cost was added to the system hardware cost to get the total field hardware cost. Using these cost values and the appropriate discount factors, the SIR and simple payback were calculated for each building.

The building economic summary table ranks the buildings from highest to lowest SIR. Those buildings with SIRs less than 1.25 were summed and reported as non-qualifying buildings. The non-qualifying building totals were subtracted from the totals for all buildings to determine the totals for qualifying buildings.

6.3 PROPOSED UMCS CONFIGURATION

The proposed UMCS configuration (as listed in Table 6-1) contains a combined total of 9,752 new digital and analog input and output points in 190 buildings.

Figure 6-1 on page 6-8 illustrates the proposed UMCS configuration. This figure is not intended to represent any particular manufacturer's equipment, but a general schematic of the system hardware.

Table 6-1. Building Economic Summary

6914	EXC MAIN RETL	222	425,289	12,797	29	$76,642	20	24	11	49	104	$21,172	$2,810	$23,982	$710,871	29.64	0.31
0403	ADMIN GEN PURP	0	219,576	664	12	$12,094	6	0	6	4	16	$3,970	$1,034	$5,004	$108,166	21.62	0.41
0500	POST HQ BLDG	0	329,263	2,396	10	$23,711	9	0	11	13	33	$9,065	$1,034	$10,099	$215,523	21.34	0.43
4010	DENTAL CLINIC	70	265,252	2,494	22	$23,545	10	8	9	19	46	$9,507	$1,347	$10,854	$213,857	19.70	0.46
0210	MILIT PERS BLDG	169	879,865	4,208	30	$58,707	14	33	9	59	115	$23,944	$2,947	$26,891	$527,189	19.60	0.46
7285	CLOTHING SALES	38	134,509	3,177	15	$19,969	7	5	5	18	35	$9,017	$1,073	$10,090	$184,815	18.32	0.51
8063	ENL PERS DIN	42	155,912	1,591	8	$14,249	3	9	2	15	29	$6,056	$1,034	$7,090	$129,706	18.29	0.50
7866	THEATER W/DRESS RM	46	166,101	1,678	16	$15,332	8	6	6	15	35	$6,933	$1,210	$8,143	$139,408	17.12	0.53
7832	GYMNASIUM	0	16,566	4,706	8	$20,264	9	7	6	30	52	$10,157	$1,210	$11,367	$192,409	16.93	0.56
7632	GYMNASIUM	0	16,566	4,627	8	$19,940	9	7	6	30	52	$10,157	$1,210	$11,367	$189,327	16.66	0.57
0200	ADMIN GEN PURP	0	290,211	2,111	20	$21,162	12	0	16	14	42	$10,852	$1,269	$12,121	$192,208	15.86	0.57
0808	BN ADMIN & CLRM	42	193,866	467	11	$11,277	3	8	3	11	25	$5,281	$1,052	$6,333	$100,121	15.81	0.56
0802	BN ADMIN & CLRM	42	193,866	467	11	$11,277	3	8	3	11	25	$5,281	$1,052	$6,333	$100,121	15.81	0.56
7024	GYMNASIUM	0	16,566	4,623	8	$19,922	9	7	6	30	52	$10,157	$1,928	$12,085	$189,156	15.65	0.61
0206	ADMIN GEN PURP	50	103,133	1,316	15	$11,303	7	3	6	12	28	$5,371	$1,269	$6,640	$102,897	15.50	0.59
6940	INDOOR SWIM POOL	0	98,409	1,196	7	$9,159	6	2	3	12	23	$4,500	$1,210	$5,710	$84,071	14.72	0.62
0205	CAVALRY MUSEUM	3	141,302	1,221	16	$11,320	4	7	4	16	31	$6,460	$1,269	$7,729	$103,052	13.33	0.68
6620	COMMUN ACT CTR	148	212,488	2,701	19	$24,120	10	16	10	34	70	$14,849	$2,010	$16,859	$219,062	12.99	0.70
0509	ADMIN GEN PURPOSE	0	39,438	370	0	$3,153	1	0	1	2	4	$1,213	$1,034	$2,247	$28,831	12.83	0.71
7665	DENTAL CLINIC	45	131,606	983	13	$10,940	4	8	7	14	33	$7,005	$1,164	$8,169	$98,729	12.09	0.75
0820	TAC EQUIP SHOP	25	144,124	1,030	7	$11,003	7	6	3	21	37	$7,285	$1,052	$8,337	$99,592	11.95	0.76
7670	DENTAL CLINIC	71	112,911	1,297	13	$12,130	7	8	8	16	39	$8,123	$1,164	$9,287	$109,977	11.84	0.77
0202	PHYS FITNESS CTR	46	77,018	2,760	18	$16,168	14	8	7	33	62	$11,910	$1,269	$13,179	$150,075	11.39	0.82
0741	MNT HANGAR COMB	0	62,035	2,677	26	$14,214	4	8	4	20	36	$11,066	$1,164	$12,230	$132,917	10.87	0.86
8071	RGT HQ BUILD	15	131,511	300	8	$7,238	2	8	2	11	23	$4,895	$1,034	$5,929	$64,332	10.85	0.82
5800	YOUTH CTR	79	191,057	1,422	23	$16,314	10	11	10	25	56	$11,764	$2,147	$13,911	$146,990	10.57	0.85
0319	GEN INSTR BLDG	32	76,592	499	10	$6,275	5	3	4	10	22	$4,372	$1,128	$5,500	$56,372	10.25	0.88
8330	VEH MNT SHOP ORG	10	159,847	1,620	10	$13,768	10	7	6	25	48	$10,369	$2,010	$12,379	$125,765	10.16	0.90
0405	ADMIN GEN PURP	58	79,203	1,169	11	$9,832	5	2	7	19	33	$7,949	$1,034	$8,983	$89,499	9.96	0.91
8100	CONSOLIDATED MNT	115	1,581,158	10,388	59	$112,445	64	58	31	179	332	$77,305	$26,040	$103,345	$1,018,279	9.85	0.92
0722	FLIGHT SIMULATOR	62	255,249	870	17	$16,105	7	10	8	31	56	$11,164	$3,724	$14,888	$143,595	9.64	0.92
5302	POST OFFICE	45	134,508	367	15	$8,586	5	8	5	15	33	$6,765	$1,347	$8,112	$76,141	9.39	0.94
7264	LIBRARY MAIN	94	195,808	1,161	14	$15,609	9	15	7	32	63	$13,104	$1,873	$14,977	$139,947	9.34	0.96
0203	CAVALRY MUSEUM	54	64,425	589	14	$6,801	8	4	5	12	29	$5,696	$1,269	$6,965	$61,104	8.77	1.02
7854	BN HQ BLDG	74	105,963	143	11	$7,119	5	4	6	14	29	$6,107	$1,164	$7,271	$62,406	8.58	1.02
5315	MORRIS HILL CHAPEL	132	160,451	676	22	$13,309	14	3	16	21	54	$12,413	$1,347	$13,760	$117,972	8.57	1.03
7485	BOWLING ALLEY	116	309,641	1,303	20	$21,589	10	12	8	34	64	$15,521	$7,244	$22,765	$192,718	8.47	1.05
7638	BN ADMIN & CLRM	36	105,513	207	12	$6,421	4	7	4	12	27	$5,524	$1,210	$6,734	$56,712	8.42	1.05
8069	IN SW POOL/GYM	12	148,240	2,669	12	$17,725	16	21	4	47	88	$18,147	$1,834	$19,981	$163,722	8.19	1.13
0406	CID BLDG	28	65,052	700	12	$6,568	3	9	5	13	30	$6,336	$1,034	$7,370	$59,579	8.08	1.12

7624	BN ADMIN & CLRM	36	111,987	219	12	$6,739	4	8	4	14	30	$6,195	$1,210	$7,405	$59,544	8.04	1.10
7108	BN ADMIN & CLRM	12	97,067	281	11	$5,727	3	8	3	11	25	$5,281	$1,210	$6,491	$51,008	7.86	1.13
7630	BN ADMIN & CLRM	36	108,687	213	12	$6,579	4	8	4	14	30	$6,195	$1,210	$7,405	$58,124	7.85	1.13
0222	ADMIN GEN PURP	34	70,345	484	11	$6,043	6	3	6	12	27	$5,610	$1,347	$6,957	$54,266	7.80	1.15
0602	DENTAL CLINIC	67	161,751	555	18	$11,104	12	9	9	22	52	$10,651	$2,147	$12,798	$98,668	7.71	1.15
7856	ENL PERS DIN	77	72,397	1,158	8	$9,927	8	9	7	26	50	$10,545	$1,164	$11,709	$90,196	7.70	1.18
7865	UNIT CHAPEL	46	79,893	461	13	$6,682	7	3	6	15	31	$6,676	$1,098	$7,774	$59,719	7.68	1.16
7804	ENL PERS DIN	80	68,819	1,158	8	$9,839	8	9	7	26	50	$10,545	$1,098	$11,643	$89,410	7.68	1.18
7806	BN HQ BLDG	74	105,963	142	11	$7,114	6	5	7	15	33	$7,065	$1,098	$8,163	$62,363	7.64	1.15
7920	VEH MNT SHOP DS	48	344,189	4,073	21	$32,721	31	32	13	98	174	$36,562	$3,610	$40,172	$299,449	7.45	1.23
7620	BN ADMIN & CLRM	25	74,734	435	12	$5,796	4	8	4	14	30	$6,195	$1,210	$7,405	$52,002	7.02	1.28
7218	BN HQ BLDG	37	97,887	331	13	$6,659	5	8	6	16	35	$7,433	$1,073	$8,506	$59,180	6.96	1.28
0853	MNT HANGAR AVUM	22	196,818	1,082	16	$13,532	15	17	6	46	84	$16,600	$1,052	$17,652	$121,917	6.91	1.30
8380	VEH MNT SHOP ORG	67	385,062	1,639	15	$24,727	24	29	9	78	140	$29,369	$2,764	$32,133	$221,649	6.90	1.30
8410	VEH MNT SHOP ORG	67	385,062	1,764	15	$25,244	24	29	9	78	140	$29,369	$3,610	$32,979	$226,578	6.87	1.31
8390	TAC EQUIP SHOP	11	98,598	945	10	$8,495	9	8	5	26	48	$10,439	$1,073	$11,512	$77,373	6.72	1.36
0330	DEH ADMIN	24	116,801	618	18	$8,407	12	12	6	24	54	$10,128	$1,128	$11,256	$75,468	6.70	1.34
7836	BN ADMIN & CLRM	88	208,699	515	23	$13,526	7	24	8	38	77	$16,451	$2,010	$18,461	$119,648	6.48	1.36
7824	BN ADMIN & CLRM	88	208,699	515	23	$13,526	7	24	8	38	77	$16,451	$2,010	$18,461	$119,648	6.48	1.36
0814	MEDICAL FAC - NEW	30	80,234	549	19	$6,801	7	8	8	17	40	$8,389	$1,052	$9,441	$61,104	6.47	1.39
0835	MAF OPS BLDG	32	165,403	367	11	$9,424	3	4	3	15	25	$6,738	$6,332	$13,070	$83,606	6.40	1.39
0817	MNT HANGAR AVUM	18	240,516	553	19	$13,122	16	15	7	46	84	$16,442	$1,852	$18,294	$116,693	6.38	1.39
7017	BN HQ BLDG	8	26,027	152	3	$1,988	2	2	1	4	9	$1,688	$1,128	$2,816	$17,851	6.34	1.42
0029	RED CROSS BLDG	11	23,529	416	6	$3,104	4	4	2	8	18	$3,376	$1,128	$4,504	$28,431	6.31	1.45
6910	EXC SP ST FAC	8	14,588	514	6	$3,078	4	4	2	8	18	$3,376	$1,210	$4,586	$28,526	6.22	1.49
7820	BN ADMIN & CLRM	22	65,750	382	12	$5,135	4	8	4	14	30	$6,195	$1,210	$7,405	$46,052	6.22	1.44
7212	CO HQ BLDG	2	38,414	820	6	$5,151	7	4	3	18	32	$6,629	$1,073	$7,702	$47,715	6.20	1.50
8360	VEH MNT SHOP ORG	6	80,015	1,874	12	$11,463	12	14	6	40	72	$15,188	$2,010	$17,198	$106,325	6.18	1.50
7270	BN HQ BLDG	26	62,563	417	15	$5,315	4	9	4	15	32	$6,651	$1,073	$7,724	$47,698	6.18	1.45
0724	FLIGHT SIMULATOR	40	130,611	553	23	$9,249	10	11	11	24	56	$11,516	$1,964	$13,480	$82,520	6.12	1.46
7086	UNIT CHAPEL	34	56,713	555	16	$5,876	6	3	7	19	35	$7,817	$1,128	$8,945	$52,992	5.92	1.52
1470	AR VEH MNT SHOP	10	113,444	891	14	$8,937	11	6	8	24	49	$10,520	$3,280	$13,800	$81,071	5.87	1.54
0302	FINANCE ADMIN	45	139,855	795	15	$10,553	7	6	6	23	42	$10,512	$6,408	$16,920	$94,737	5.60	1.60
8370	VEH MNT SHOP ORG	13	68,566	1,125	6	$7,933	9	11	4	29	53	$11,181	$2,010	$13,191	$73,007	5.53	1.66
7220	CO HQ BLDG	56	59,504	563	14	$6,550	11	4	8	23	46	$9,553	$1,073	$10,626	$58,802	5.53	1.62
7109	BN ADMIN & CLRM	91	193,078	235	22	$11,789	8	3	9	19	39	$10,834	$8,250	$19,084	$103,521	5.42	1.62
0812	ADMIN & SUPPORT BLD	10	78,701	790	6	$6,896	8	5	3	30	46	$9,854	$1,852	$11,706	$62,893	5.37	1.70
0301	FINANCE ADMIN	89	243,190	1,108	31	$17,627	9	13	11	47	80	$18,287	$12,488	$30,775	$157,433	5.12	1.75
7033	BN HQ BLDG	3	40,044	199	4	$2,648	3	3	2	9	17	$3,559	$1,128	$4,687	$23,819	5.08	1.77
7656	GEN INST BLDG	79	79,637	509	21	$7,898	7	16	8	27	58	$12,328	$1,898	$14,226	$70,291	4.94	1.80
0833	AIRCRAFT HANGAR	9	92,061	432	16	$6,205	10	8	6	24	48	$9,439	$1,852	$11,291	$55,655	4.93	1.82
0810	ADMIN & SUPPLY BLDG	15	67,888	508	9	$5,489	8	4	4	26	42	$9,079	$1,052	$10,131	$49,614	4.90	1.85
7654	ENL PERS DIN	77	79,101	702	18	$8,567	10	10	9	41	70	$12,256	$3,658	$15,914	$76,784	4.82	1.86
0313	CIV PERS BLDG	14	16,769	84	3	$1,481	2	2	1	4	9	$1,688	$1,128	$2,816	$13,150	4.67	1.90

0727	MNT HANGAR COMB	35	106,473	774	17	$8,895	14	8	13	32	67	$15,254	$1,964	$17,218	$80,164	4.66	1.94
0806	COMB AC-HTG PLANT	134	17,013	18	20	$4,662	16	0	10	14	40	$7,546	$1,052	$8,598	$40,015	4.65	1.84
7739	MVNG TRGT SIM BLDG	17	48,916	311	15	$4,092	5	8	5	15	33	$6,765	$1,164	$7,929	$36,688	4.63	1.94
7622	BN ADMIN & CLRM	53	143,225	433	23	$9,608	7	24	8	38	77	$16,451	$2,010	$18,461	$85,214	4.62	1.92
7432	ADMIN & SUPPORT BLD	19	65,480	540	8	$5,596	10	5	6	27	48	$9,942	$1,164	$11,106	$50,636	4.56	1.98
0804	RGT HQ BUILD	14	52,305	116	8	$3,179	2	7	2	13	24	$5,256	$1,052	$6,308	$28,135	4.46	1.98
8065	CLINIC W/O BEDS	1	38,471	436	8	$3,605	3	9	3	14	29	$6,390	$1,034	$7,424	$32,946	4.44	2.06
7034	CLINIC W/O BEDS	0	36,882	363	9	$3,234	2	8	4	12	26	$5,524	$1,128	$6,652	$29,465	4.43	2.06
7410	BN ADMIN & CLRM	37	84,221	337	13	$6,124	5	4	6	19	34	$7,750	$4,593	$12,343	$54,493	4.41	2.02
0751	AC PTS & TOE ST	3	12,986	350	7	$2,226	4	2	5	7	18	$3,916	$764	$4,680	$20,562	4.39	2.10
7604	GEN INST BLDG	78	86,059	467	21	$7,974	8	19	8	33	68	$14,444	$1,964	$16,408	$70,837	4.32	2.06
6918	SKILL DEV CTR	0	108,121	1,115	0	$9,059	9	24	0	49	82	$17,276	$2,010	$19,286	$82,985	4.30	2.13
8021	ADMIN & SUPPORT BLD	3	53,799	618	3	$4,919	7	6	2	29	44	$9,545	$1,034	$10,579	$45,056	4.26	2.15
7858	ADMIN & SUPPORT BLD	12	18,344	161	7	$1,897	3	0	4	5	12	$2,878	$1,164	$4,042	$17,033	4.21	2.13
0610	ENL BARRACKS W/AS	131	2,030	4	12	$3,721	8	1	5	15	29	$6,275	$1,347	$7,622	$31,774	4.17	2.05
7245	ENL PERS DIN	18	76,912	654	17	$6,730	8	11	6	42	67	$11,884	$2,833	$14,717	$60,899	4.14	2.19
7520	VEH MNT SHOP ORG	0	48,512	1,250	0	$7,152	11	15	2	40	68	$14,579	$1,873	$16,452	$66,651	4.05	2.30
0253	DRUG ABUSE CTR	46	117,379	1,005	14	$10,498	13	21	7	55	96	$20,572	$2,947	$23,519	$94,900	4.04	2.24
7606	ENL PERS DIN	71	66,215	641	18	$7,614	10	11	9	44	74	$13,365	$3,829	$17,194	$68,273	3.97	2.26
7636	REGIMENTAL HQ BLDG	29	46,217	131	11	$3,447	7	2	7	14	30	$6,551	$1,210	$7,761	$30,421	3.92	2.25
0003	POST CHAPEL	1	21,908	271	7	$2,201	4	3	4	9	20	$4,007	$1,128	$5,135	$20,118	3.92	2.33
8023	ADMIN & SUPPORT BLD	2	43,522	619	3	$4,463	7	6	2	29	44	$9,545	$1,034	$10,579	$41,064	3.88	2.37
8059	ADMIN & SUPPORT BLD	2	43,522	619	3	$4,463	7	6	2	29	44	$9,545	$1,128	$10,673	$41,064	3.85	2.39
8057	ADMIN & SUPPORT BLD	2	43,522	618	3	$4,459	7	6	2	29	44	$9,545	$1,128	$10,673	$41,034	3.84	2.39
0006	POST CHAPEL	7	44,244	356	7	$3,649	6	8	3	19	36	$7,506	$1,128	$8,634	$33,047	3.83	2.37
0404	ENL BARRACKS W/DAS	108	34,513	322	15	$5,875	9	9	9	30	57	$11,809	$1,834	$13,643	$51,798	3.80	2.32
0840	VEHICLE MNT SHOP OR	8	44,131	317	7	$3,488	7	5	4	19	35	$7,337	$1,052	$8,389	$31,517	3.76	2.40
7900	VEH MNT SHOP ORG	0	55,902	965	0	$6,285	11	15	2	40	68	$14,579	$1,098	$15,677	$58,165	3.71	2.49
7500	VEH MNT SHOP ORG	0	55,902	1,029	0	$6,548	11	15	2	40	68	$14,579	$1,873	$16,452	$60,667	3.69	2.51
7450	REGIMENTAL HQ BLDG	29	39,781	121	11	$3,138	6	3	6	14	29	$6,437	$1,073	$7,510	$27,677	3.69	2.39
7720	VEH MNT SHOP ORG	0	55,902	1,029	0	$6,548	11	15	2	40	68	$14,579	$1,964	$16,543	$60,667	3.67	2.53
7940	VEH MNT SHOP ORG	0	48,512	1,018	0	$6,200	11	15	2	40	68	$14,579	$1,210	$15,789	$57,579	3.65	2.55
7350	VEH MNT SHOP ORG	0	51,715	1,034	0	$6,395	11	15	2	40	68	$14,579	$1,873	$16,452	$59,342	3.61	2.57
7960	VEH MNT SHOP ORG	0	55,902	920	0	$6,100	11	15	2	40	68	$14,579	$1,210	$15,789	$56,405	3.57	2.59
8020	DET DAY ROOM	2	22,155	67	0	$1,253	1	3	0	6	10	$2,116	$1,034	$3,150	$11,192	3.55	2.51
8010	DET DAY ROOM	2	22,155	67	0	$1,253	1	3	0	6	10	$2,116	$1,034	$3,150	$11,192	3.55	2.51
7802	ADMIN & SUPPORT BLD	12	18,344	161	11	$1,993	3	0	6	8	17	$4,044	$1,098	$5,142	$17,852	3.47	2.58
0207	CAVALRY MUSEUM	28	119,303	670	46	$9,499	16	24	13	55	108	$22,425	$2,069	$24,494	$85,016	3.47	2.58
7826	CLINIC W/O BEDS	8	23,854	324	12	$2,824	4	8	4	14	30	$6,195	$1,210	$7,405	$25,673	3.47	2.62
8046	DET DAY ROOM	2	22,155	67	0	$1,253	1	3	0	6	10	$2,116	$1,128	$3,244	$11,192	3.45	2.59
8056	DET DAY ROOM	2	22,155	67	0	$1,253	1	3	0	6	10	$2,116	$1,128	$3,244	$11,192	3.45	2.59
8340	VEH MNT SHOP ORG	0	55,902	933	0	$6,152	11	15	2	40	68	$14,579	$2,010	$16,589	$56,896	3.43	2.70
8320	VEH MNT SHOP ORG	0	55,902	933	0	$6,152	11	15	2	40	68	$14,579	$2,010	$16,589	$56,896	3.43	2.70
8300	VEH MNT SHOP ORG	0	55,902	933	0	$6,152	11	15	2	40	68	$14,579	$2,010	$16,589	$56,896	3.43	2.70

7028	BN CLASSROOMS	2	34,535	67	7	$1,932	4	0	4	9	17	$4,074	$1,128	$5,202	$17,115	3.29	2.69
7760	VEH MNT SHOP ORG	0	49,203	878	0	$5,650	11	15	2	40	68	$14,579	$1,898	$16,477	$52,320	3.18	2.92
7031	BN HQ BLDG	1	30,981	66	7	$1,755	2	0	4	9	15	$3,797	$1,128	$4,925	$15,561	3.16	2.81
7626	CLINIC W/O BEDS	10	28,096	311	13	$3,009	5	8	6	16	35	$7,433	$1,210	$8,643	$27,240	3.15	2.87
7808	ADMIN & SUPPORT BLD	14	23,079	164	14	$2,308	4	0	7	12	23	$5,462	$1,098	$6,560	$20,602	3.14	2.84
7036	REGIMENTAL HQ BLDG	2	47,024	74	4	$2,406	5	2	4	13	24	$5,713	$1,128	$6,841	$21,312	3.12	2.84
7780	VEH MNT SHOP ORG	0	55,902	791	0	$5,568	11	15	2	40	68	$14,579	$1,898	$16,477	$51,328	3.12	2.96
7834	REGIMENTAL HQ BLDG	28	28,924	32	11	$2,299	4	0	7	11	22	$5,278	$1,210	$6,488	$20,041	3.09	2.82
0720	AF OPS BLDG	15	26,324	245	9	$2,705	6	8	3	18	35	$6,805	$1,164	$7,969	$24,352	3.06	2.95
7852	ADMIN & SUPPORT BLD	19	25,600	164	18	$2,644	5	0	9	14	28	$6,557	$1,164	$7,721	$23,498	3.04	2.92
7046	BN CLASSROOMS	2	30,324	66	7	$1,755	4	0	4	9	17	$4,074	$1,073	$5,147	$15,559	3.02	2.93
0402	ENL BARRACKS W/AS	79	38,560	322	23	$5,476	6	21	9	36	72	$15,207	$1,034	$16,241	$48,433	2.98	2.97
7047	BN HQ BLDG	1	28,238	66	7	$1,630	2	0	4	9	15	$3,797	$1,073	$4,870	$14,467	2.97	2.99
0364	UEMCS HQ	3	6,221	118	3	$878	2	2	1	4	9	$1,688	$1,128	$2,816	$8,040	2.86	3.21
7048	BN HQ BLDG	1	26,812	46	7	$1,500	2	0	4	9	15	$3,797	$1,073	$4,870	$13,257	2.72	3.25
7215	BN HQ BLDG	7	23,136	1	10	$1,390	3	2	4	8	17	$3,424	$1,073	$4,497	$12,101	2.69	3.24
7305	APP INSTR BLDG	16	21,606	369	12	$3,109	8	12	4	24	48	$9,436	$1,073	$10,509	$28,264	2.69	3.38
7648	ENL BARRACKS W/O DI	131	18,018	838	51	$8,748	12	42	17	60	131	$27,848	$1,898	$29,746	$78,256	2.63	3.40
7646	ENL BARRACKS W/O DI	124	18,018	838	42	$8,369	9	42	14	60	125	$26,690	$1,898	$28,588	$75,022	2.62	3.42
7650	ENL BARRACKS W/O DI	122	17,840	838	42	$8,306	9	42	14	60	125	$26,690	$1,898	$28,588	$74,484	2.61	3.44
0410	ENL BARRACKS W/AS	88	45,848	206	26	$5,596	8	22	11	41	82	$18,089	$1,034	$19,123	$49,051	2.57	3.42
7644	ENL BARRACKS W/O DI	116	17,840	838	42	$8,143	9	42	14	60	125	$26,690	$1,898	$28,588	$73,092	2.56	3.51
7642	ENL BARRACKS W/O DI	115	17,840	838	42	$8,128	9	42	14	60	125	$26,690	$1,898	$28,588	$72,970	2.55	3.52
7618	ENL BARRACKS W/O DI	116	17,840	838	42	$8,143	9	42	14	60	125	$26,690	$2,069	$28,759	$73,092	2.54	3.53
5309	GUEST HOUSE	45	875	7	15	$1,569	4	0	9	6	19	$4,048	$1,347	$5,395	$13,420	2.49	3.44
7243	ADMIN & SUPPORT BLD	0	30,837	120	13	$2,089	8	1	6	14	29	$6,518	$1,073	$7,591	$18,629	2.45	3.63
0227	ENL BARRACKS W/AS	77	43,122	291	22	$5,461	9	20	11	44	84	$17,517	$2,147	$19,664	$48,225	2.45	3.60
0214	ENL BARRACKS W/AS	81	45,379	288	27	$5,770	13	21	11	47	92	$18,822	$2,147	$20,969	$50,875	2.43	3.63
7848	ENL BARRACKS W/O DI	83	1,292	17	24	$2,805	7	0	12	22	41	$9,334	$1,164	$10,498	$24,010	2.29	3.74
7844	ENL BARRACKS W/O DI	83	1,292	17	24	$2,805	7	0	12	22	41	$9,334	$1,164	$10,498	$24,010	2.29	3.74
8025	BN ADMIN & CLRM	5	94,052	4	21	$4,527	5	25	5	37	72	$15,592	$1,834	$17,426	$39,607	2.27	3.85
7850	ENL BARRACKS W/AS	82	1,269	17	24	$2,776	7	0	12	22	41	$9,334	$1,164	$10,498	$23,764	2.26	3.78
7846	ENL BARRACKS W/AS	82	1,269	17	24	$2,776	7	0	12	22	41	$9,334	$1,164	$10,498	$23,764	2.26	3.78
7842	ENL BARRACKS W/AS	82	1,269	17	24	$2,776	7	0	12	22	41	$9,334	$1,164	$10,498	$23,764	2.26	3.78
0223	ENL BARRACKS W/DAS	96	40,608	365	33	$6,430	13	29	12	54	108	$23,175	$2,147	$25,322	$56,767	2.24	3.94
8037	BN ADMIN & CLRM	5	93,519	4	21	$4,505	6	25	6	36	73	$15,794	$1,928	$17,722	$39,413	2.22	3.93
5000	FIRE STATION	8	5,161	269	12	$1,826	3	8	4	16	31	$6,408	$1,347	$7,755	$16,735	2.16	4.25
0723	MNT HANGAR COMB	0	8,374	431	10	$2,363	7	3	8	18	36	$9,163	$1,164	$10,327	$22,021	2.13	4.37
8044	APP INSTR BLDG	9	6,611	105	3	$1,006	3	4	1	8	16	$3,133	$1,128	$4,261	$9,078	2.13	4.24
0411	ENL BARRACKS W/AS	84	45,856	191	28	$5,500	9	28	12	51	100	$21,870	$1,834	$23,704	$48,176	2.03	4.31
0409	ENL BARRACKS W/AS	84	45,856	191	31	$5,572	9	29	12	52	102	$22,326	$1,834	$24,160	$48,791	2.02	4.34
7818	ENL BARRACKS W/O DI	85	4,701	98	27	$3,424	10	4	13	31	58	$12,794	$1,898	$14,692	$29,658	2.02	4.29
0540	OFF QTRS MILIT	40	700	7	17	$1,492	3	0	7	14	24	$5,411	$1,034	$6,445	$12,766	1.98	4.32
0542	OFF QTRS MILIT	40	700	7	17	$1,492	3	0	7	14	24	$5,411	$1,034	$6,445	$12,766	1.98	4.32

7816	ENL BARRACKS W/O DI	81	4,696	98	27	$3,306	10	4	13	31	58	$12,794	$1,898	$14,692	$28,652	1.95	4.44
7812	ENL BARRACKS W/O DI	81	4,696	98	27	$3,306	10	4	13	31	58	$12,794	$1,898	$14,692	$28,652	1.95	4.44
7616	ENL BARRACKS W/AS	82	4,634	99	27	$3,339	10	4	13	31	58	$12,794	$2,069	$14,863	$28,936	1.95	4.45
0211	ADMIN	3	15,902	125	17	$1,661	5	6	7	14	32	$6,474	$1,269	$7,743	$14,847	1.92	4.66
7810	ENL BARRACKS W/O DI	78	4,634	98	27	$3,228	10	4	13	31	58	$12,794	$1,898	$14,692	$27,990	1.91	4.55
7814	ENL BARRACKS W/O DI	78	4,634	98	27	$3,228	10	4	13	31	58	$12,794	$1,898	$14,692	$27,990	1.91	4.55
7614	ENL BARRACKS W/AS	78	4,634	99	27	$3,229	10	4	13	31	58	$12,794	$2,069	$14,863	$27,993	1.88	4.60
0710	TAC EQUIP SHOP	5	14,809	118	7	$1,396	6	3	4	13	26	$5,505	$1,164	$6,669	$12,543	1.88	4.78
0512	SR ENL QTRS	39	2,786	17	11	$1,455	5	3	7	12	27	$5,692	$1,034	$6,726	$12,510	1.86	4.62
7612	ENL BARRACKS W/AS	76	4,634	99	27	$3,183	10	4	13	31	58	$12,794	$2,069	$14,863	$27,604	1.86	4.67
0650	COLD STOR FAC	0	0	0	34	$816	0	0	0	13	13	$2,452	$1,347	$3,799	$6,960	1.83	4.66
0541	OFF QTRS MILIT	40	700	7	18	$1,516	3	0	8	16	27	$6,263	$1,034	$7,297	$12,971	1.78	4.81
7658	ADMIN & SUPPORT BLD	16	20,505	169	11	$2,220	8	10	6	26	50	$10,442	$1,098	$11,540	$19,847	1.72	5.20
7610	ENL BARRACKS W/AS	63	4,459	99	27	$2,849	10	4	13	31	58	$12,794	$2,069	$14,863	$24,754	1.67	5.22
0652	COLD STOR FAC	0	0	0	18	$432	0	0	0	5	5	$979	$1,347	$2,326	$3,685	1.58	5.38
7050	ENL BARRACKS W/AS	21	18,887	78	25	$2,231	6	4	12	30	52	$11,634	$1,073	$12,707	$19,551	1.54	5.69
7404	ENL BARRACKS W/O DI	8	29,731	18	24	$2,089	5	14	9	24	52	$10,997	$1,073	$12,070	$18,200	1.51	5.78
7424	ENL BARRACKS W/O DI	8	28,331	5	24	$1,975	5	14	9	24	52	$10,997	$1,073	$12,070	$17,159	1.42	6.11
7652	ADMIN & SUPPORT BLD	16	20,505	6	11	$1,546	8	10	6	26	50	$10,442	$1,098	$11,540	$13,418	1.16	7.47
7176	MOTOR POOL MNT SHO	0	2,048	42	4	$354	2	0	4	3	9	$2,228	$728	$2,956	$3,217	1.09	8.34
7602	ADMIN & SUPPORT BLD	15	18,220	6	11	$1,422	8	10	6	26	50	$10,442	$1,269	$11,711	$12,344	1.05	8.23
7608	ADMIN & SUPPORT BLD	15	16,655	6	11	$1,358	8	10	6	26	50	$10,442	$1,164	$11,606	$11,777	1.01	8.55
0027	OFF QTRS MILIT	6	0	5	14	$500	2	0	6	6	14	$3,104	$1,128	$4,232	$4,282	1.01	8.47
7053	ENL BARRACKS W/AS	7	0	25	21	$773	3	0	9	15	27	$6,068	$1,073	$7,141	$6,696	0.94	9.24
8006	ENL BARRACKS W/O DI	7	0	4	3	$277	1	1	1	7	10	$2,527	$1,034	$3,561	$2,380	0.67	12.84
8002	ENL BARRACKS W/O DI	7	0	4	3	$277	1	1	1	7	10	$2,527	$1,034	$3,561	$2,380	0.67	12.84
8042	ENL BARRACKS W/O DI	7	0	4	3	$277	1	1	1	7	10	$2,527	$1,128	$3,655	$2,380	0.65	13.18
8038	ENL BARRACKS W/O DI	7	0	4	3	$277	1	1	1	7	10	$2,527	$1,128	$3,655	$2,380	0.65	13.18
8052	SR ENL QTRS	7	0	4	3	$277	1	1	1	7	10	$2,527	$1,128	$3,655	$2,380	0.65	13.18
0621	OFF QTRS TRANS	0	4,800	2	0	$208	1	1	1	3	6	$1,495	$1,347	$2,842	$1,829	0.64	13.69
0760	BN HQ BLDG	0	0	0	7	$168	1	1	3	2	7	$1,471	$764	$2,235	$1,433	0.64	13.30
8012	ENL BARRACKS W/O DI	5	0	4	3	$205	1	1	1	7	10	$2,527	$1,034	$3,561	$1,764	0.50	17.37
8008	ENL BARRACKS W/O DI	2	0	2	3	$142	1	1	1	7	10	$2,527	$1,034	$3,561	$1,223	0.34	24.99
8014	ENL BARRACKS W/O DI	2	0	2	3	$142	1	1	1	7	10	$2,527	$1,034	$3,561	$1,223	0.34	24.99
8050	ENL BARRACKS W/O DI	2	0	2	3	$142	1	1	1	7	10	$2,527	$1,128	$3,655	$1,223	0.33	25.65
8048	ENL BARRACKS W/O DI	2	0	2	3	$142	1	1	1	7	10	$2,527	$1,128	$3,655	$1,223	0.33	25.65
8040	ENL BARRACKS W/O DI	2	0	2	3	$142	1	1	1	7	10	$2,527	$1,128	$3,655	$1,223	0.33	25.65
8054	ENL BARRACKS W/O DI	2	0	2	3	$124	1	1	1	7	10	$2,527	$1,128	$3,655	$1,069	0.29	29.38
7178	MOTOR POOL ADMIN	0	676	7	0	$57	2	0	2	4	8	$2,426	$728	$3,154	$521	0.17	55.46
0620	OFF QTRS MILIT	0	0	2	0	$9	0	1	0	3	4	$1,109	$1,347	$2,456	$89	0.04	263.63

[redacted]

TOT. kW SVGS	TOT. kWH SVGS	TOT. MBtu	TOT. LBR HR SVGS	TOT. CST SVGS	TOT. BLDG PNTS	TOT. SYS HARDWR CST	TOT. RCU/ ACU	TOT. HARDWR COST	TOT. DISC SAVINGS
7,582	17,108,240	153,433	2,941	1,602,487	9,914	2,130,927	370,167.00	2,501,094	14,477,998

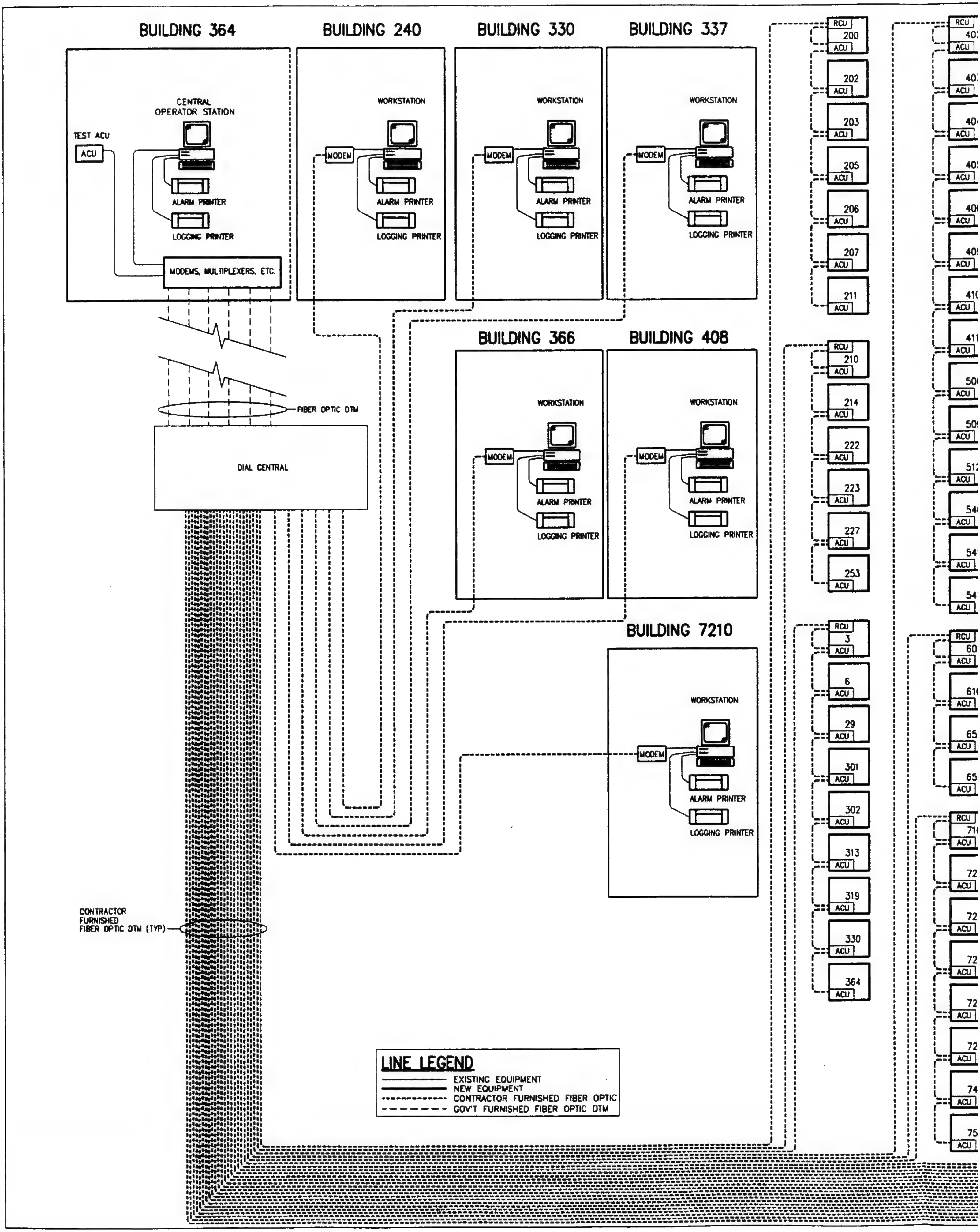
TOT DO PNTS	TOT AO PNTS	TOT DI PNTS	TOT AI PNTS
1,531	1,897	1,310	5,176

TOTAL FOR NON-QUALIFYING BUILDINGS (SIRs less than 1.25)

KW SVGS. PER YR	KWH SVGS. PER YR	MBtu SVGS. PER YR	LABOR HOUR SVGS. PER YR	$ COST SVGS PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL BLDG POINTS	SYSTEM HARDWR COST	RCU/ACU COST	TOTAL HARDWR COST	TOTAL DISC SVGS
111	62,904	137	115	$8,819	47	45	55	198	345	$79,551	$23,185	$103,263	$76,454

TOTAL FOR QUALIFYING BUILDINGS (SIRs greater than 1.25)

KW SVGS. PER YR	KWH SVGS. PER YR	MBtu SVGS. PER YR	LABOR HOUR SVGS. PER YR	$ COST SVGS PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL BLDG POINTS	SYSTEM HARDWR COST	RCU/ACU COST	TOTAL HARDWR COST	TOTAL DISC SVGS
7,471	17,045,336	153,296	2,826	$1,593,668	1,484	1,852	1,255	4,978	9,569	$2,051,376	$346,982	$2,397,831	$14,401,544
	(Water Level Alarms in Basement MERs)						71		71	$11,147		$11,147	
	(Pneumatic Control Air Monitoring)						112		112	$11,984		$11,984	
7,471	17,045,336	153,296	2,826	$1,593,668	1,484	1,852	1,438	4,978	9,752	$2,074,507	$346,982	$2,420,962	$14,401,544


BUILDING 364
BUILDING 240
BUILDING 330
BUILDING 337
CENTRAL OPERATOR STATION
TEST ACU
ACU
WORKSTATION
MODEM
ALARM PRINTER
LOGGING PRINTER
MODEMS, MULTIPLEXERS, ETC.
FIBER OPTIC DTM
DIAL CENTRAL
BUILDING 366
BUILDING 408
BUILDING 7210
CONTRACTOR FURNISHED FIBER OPTIC DTM (TYP)
RCU
200
202
203
205
206
207
211
210
214
222
223
227
253
3
6
29
301
302
313
319
330
364
LINE LEGEND
EXISTING EQUIPMENT
NEW EQUIPMENT
CONTRACTOR FURNISHED FIBER OPTIC
GOV'T FURNISHED FIBER OPTIC DTM

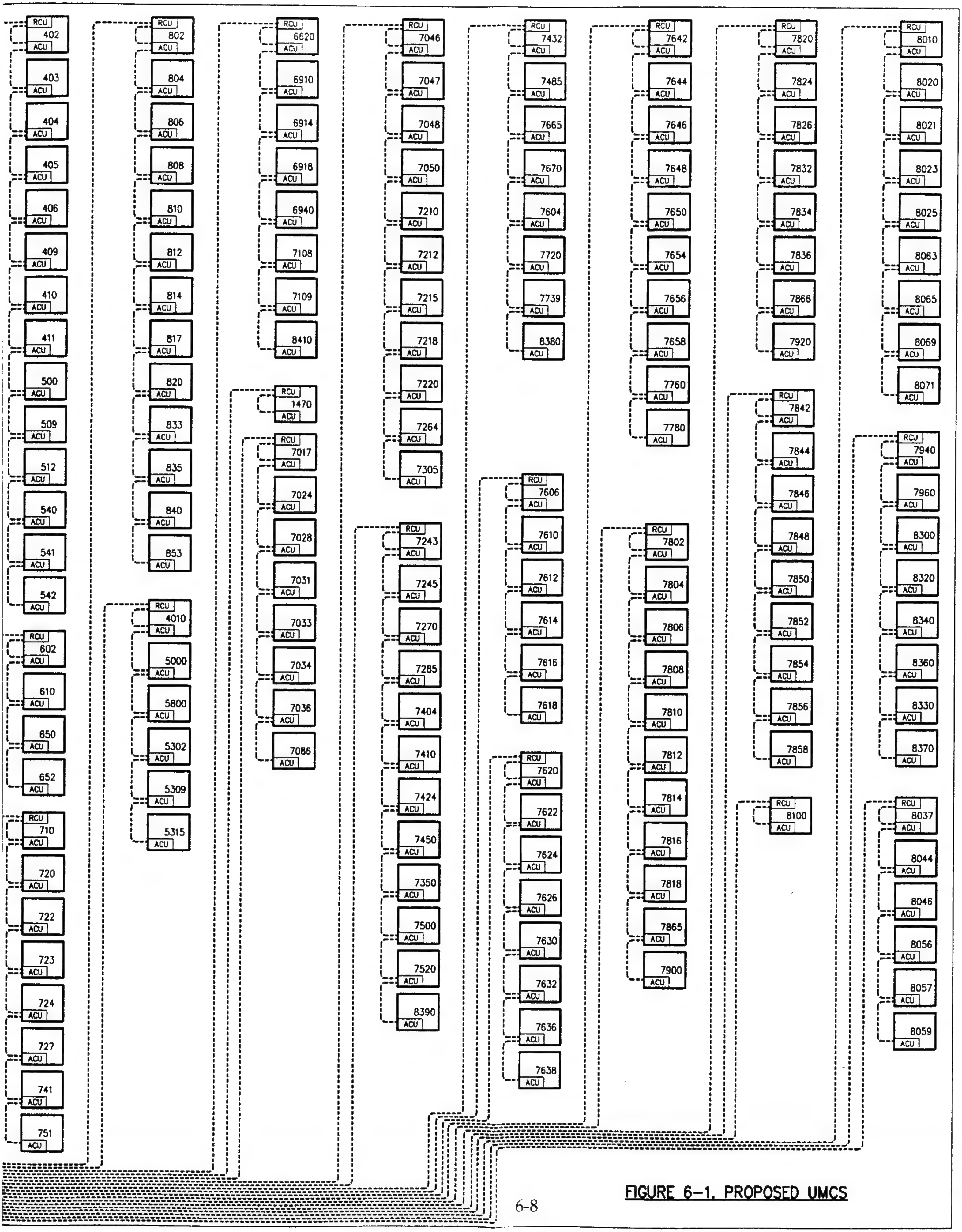


FIGURE 6-1. PROPOSED UMCS

6.4 ENERGY SAVINGS

Table 6-2 below summarizes the potential energy savings for the proposed UMCS configuration. Column A of this table lists the energy savings for the buildings analyzed for the proposed UMCS configuration. Column B lists the energy usage and energy costs incurred at Fort Riley in FY94. Column C lists the percent savings predicted for the proposed UMCS configuration.

Table 6-2. Energy Savings Summary

	(A) Annual Energy Savings	(B) Current Energy Usage	(C) % Savings (A)/(B)
Proposed UMCS Electricity (kWh)	17,045,336	169,353,256	10.1%
Proposed UMCS Nat. Gas (Mbtu)	153,296	1,244,183	12.3%

6.5 IMPLEMENTATION COSTS

The implementation costs and the total anticipated contract costs for the proposed UMCS configuration is listed in Table 6-3 on page 6-10.

The total investment, including 7.0% Supervision and Administration (S&A) and 6.0% Design, is $5,839,156 for the proposed UMCS.

Table 6-3. Implementation Costs

	Proposed UMCS (1995 $)
UMCS Software/Database	$ 144,580
Central UMCS Hardware	109,008
Training	73,110
Documentation and Submittals	50,000
Testing	197,908
Total Field Hardware	2,420,962
Fiber Optic DTM	544,847
ACM Removal	15,567
RF System	49,619
FO and UMCS Equip. for Gas Meter Monitoring	17,368
SUBTOTAL	$3,622,969
Overhead (15%)	543,445
Bond (2.5%)	104,160
Profit (10%)	427,057
Contingency (10%)	469,763
ANTICIPATED CONTRACT COSTS	$5,167,394
S&A (7.0%)	$361,718
DESIGN (6.0%)	$310,044
TOTAL INVESTMENT	**$5,839,156**

6.6 ECONOMIC SUMMARY

Table 6-4 on the following page summarizes the economics of installing the proposed UMCS as configured in this study.

Table 6-4. Proposed UMCS Economics

	Proposed UMCS (1995 $)
Total Investment, Per ECIP Guidance ($)	5,839,156
Annual Savings (MBtu)	211,472
First Year Energy Savings ($)	1,335,506
First Year Maintenance Manhours Savings ($)	67,824
First Year Electrical Demand Savings ($)	190,361
First Year Maintenance Cost ($)	(116,206)
Total Non-Energy Annual Recurring Savings ($)	(48,382)
Net First Year Savings ($)	1,477,485
Net Discounted Savings ($)	13,410,508
Simple Payback (years)	3.95
SIR	2.30

6.7 LIFE CYCLE COST ANALYSIS

The Life Cycle Cost Analysis (LCCA) for the proposed UMCS is included on the following page. The LCCA was prepared per Energy Conservation Investment Program (ECIP) Guidance, dated January 1994. The uniform present worth (UPW) factors for industrial users, a 3% discount rate, and a 10 year economic life for Census Region 2 were used in the analysis.

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION:	Fort Riley	REGION: 2 (Kansas)		PROJECT NO:	1406-005
PROJECT TITLE:	Feasibility Study for Installation of UMCS			FISCAL YEAR:	1995
ANALYSIS DATE:	12/12/95	ECONOMIC LIFE:	10	PREPARED BY:	A. Niemeyer

1. INVESTMENT: **Proposed UMCS with DDC Controls**

A.	CONSTRUCTION COST	=	$5,167,395	
B.	SIOH COST	(7.0% of 1A) =	$361,718	
C.	DESIGN COST	(6.0% of 1A) =	$310,044	
D.	TOTAL COST	(1A +1B +1C) =	$5,839,156	
E.	SALVAGE VALUE OF EXISTING EQUIPMENT =		$0	
F.	PUBLIC UTILITY COMPANY REBATE =		$0	
G.	TOTAL INVESTMENT	(1D -1E -1F) =	------->	$5,839,156

2. ENERGY SAVINGS (+) OR COST (-):

DATE OF NISTR 85-3273-9 USED FOR DISCOUNT FACTORS: JAN '95

	ENERGY SOURCE	FUEL COST $/MBTU (1)	SAVINGS MBTU/YR (2)	ANNUAL $ SAVINGS (3)	DISCOUNT FACTOR (4)	DISCOUNTED SAVINGS (5)	
A.	ELECT.	$12.10	58,176	$703,926	8.78	$6,180,473	
B.	DIST	$0.00	0	$0	9.88	$0	
C.	NAT GAS	$4.12	153,296	$631,580	9.53	$6,018,953	
D.	COAL	$0.00	0	$0	8.95	$0	
E.	ELEC. DEMAND			$190,361	8.53	$1,623,780	
F.	TOTAL		211,472	$1,525,867		-------->	$13,823,206

3. NON-ENERGY SAVINGS (+) OR COST (-)

A. ANNUAL RECURRING (+/-)

1 ANNUAL MAINTENANCE COST	($116,206)	8.53	($991,237)
2 ANNUAL MANHOUR SAVINGS	$67,824	8.53	$578,539
3		8.53	$0
4 TOTAL ANNUAL DISC. SAVINGS (+) / COST (-)	($48,382)		($412,698)

B. NON-RECURRING (+/-)

ITEM	SAVINGS (+) COST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2)	DISCOUNTED SAVINGS/COST (4)
a.	$0	1	0.971	$0
b.				$0
c.				$0
d.				$0
e.				$0
f. TOTAL	$0			$0

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = ($412,698)

4.	FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-)	(2F3+3A4+(3Bf1/Economic Life))	$1,477,485
5.	SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY)	(1G/4) =	3.95
6.	TOTAL NET DISCOUNTED SAVINGS	(2F5 + 3C) =	$13,410,508
7.	DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (MUST HAVE SIR > 1.25 TO QUALIFY)	(6/1G) =	2.30

7. SUMMARY AND RECOMMENDATIONS

7.1 SUMMARY

The proposed UMCS configuration has a simple payback of 3.95 years and an SIR of 2.30. The proposed UMCS will save 10.1% on electrical energy and 12.3% on natural gas energy.

7.2 RECOMMENDATIONS

It is recommended that the proposed UMCS be installed to control and monitor systems in 190 buildings, including replacement of the existing field hardware in the original 23 buildings. The UMCS should consist of state-of-the-art PC-based front-end central operator stations, RCU, ACU, and UCU field panels, and field hardware as described in this report, and as outlined in the latest Corps of Engineer Guide Specification for Utility Monitoring and Control System, CEGS-16935.

It is recommended that a new data transmission system, consisting of contractor-installed underground FO cable be provided for all data communication needs to the 190 buildings recommended for the UMCS.

7.3 DD1391 FORM FOR PROPOSED UMCS

The DD1391 form programming documentation for the proposed UMCS is presented starting on the following page.

1. COMPONENT ARMY	FY 1995 MILITARY CONSTRUCTION PROJECT DATA	2. DATE DEC 1995

3. INSTALLATION AND LOCATION	4. PROJECT TITLE
Fort Riley, Kansas	**Install Basewide Utility Monitoring Control System (UMCS)**

5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NO.	8. PROJECT COST ($000)
			5,840

9. COST ESTIMATES

ITEM	U/M	QUANTITY	UNIT COST	COST ($000)
Primary Facilities:				
Provide a UMCS to include 190 buildings. Provide PC-based front-end computers, Central Operator Station, Communication Processor, Remote Control Units, Auxiliary Control Units, Unitary Control Units, sensors, and actuators. Provide fiber optic data transmission to the 190 buildings on the UMCS.	LS			4,698
Estimated Contract Cost				4,698
Contingency (10%)				470
Subtotal				5,168
Supervision, Inspection and Overhead (7.0%)				362
Design Cost (6.0%)				310
TOTAL REQUEST				5,840
TOTAL REQUEST (ROUNDED)				5,840

10. DESCRIPTION OF PROPOSED CONSTRUCTION

Construct a Utility Monitoring and Control System (UMCS) to monitor and control HVAC systems, and the utilities serving 190 buildings at Fort Riley. The UMCS will replace the existing HVAC control systems and energy monitoring and control system (EMCS). The UMCS would consist of PC-based front-end computers communicating to building control units. Other associated items include software, fiber optic data communication systems, instrumentation, documentation, training, and testing of equipment.

11. REQUIREMENT

This project is required to correct local HVAC control problems and deficiencies, in order that environmental cooling and heating are adequately provided for active duty personnel at Fort Riley. This project will replace the existing local loop HVAC controls system with a new UMCS. The UMCS will monitor and control the facilities' HVAC systems, and utilities. This project will reduce the natural gas consumption, electrical consumption, and electric demand of HVAC systems through UMCS control technology. An immediate utility savings would be recognized.

1. COMPONENT ARMY	FY 1995 MILITARY CONSTRUCTION PROJECT DATA	2. DATE DEC 1995
3. INSTALLATION AND LOCATION Fort Riley, Kansas		
4. PROJECT TITLE Install Basewide Utility Monitoring Control System (UMCS)		5. PROJECT NUMBER

11. REQUIREMENT (continued)

The project will include the following items of work:

- The UMCS will include PC-based front-end computers communicating to building Control Units, to control and monitor HVAC systems.
- Existing automatic temperature control equipment will be removed and disposed of. Some end control device components will be reused in the new UMCS and will be checked and commissioned into operating condition.
- New Direct Digital Control (DDC) components will be installed, to provide the required sequences of operation, input/output functions, and monitoring functions, including necessary software, hardware, instrumentation, communications, training, and documentation.
- The field hardware in the 23 buildings on the existing EMCS will be replaced.

Modifications or repairs to the existing mechanical and electrical equipment would be provided to assure a complete, well operating control system.

Additionally, the project will result in a more functionally efficient system providing greater reliability and more accurate temperature control, and will yield significant savings in operating costs by a more accurate and precise operation of air handling units, boilers, chillers, and other equipment.

Current Situation:

Fort Riley has an existing EMCS connected to 23 buildings. The EMCS was installed in 1985. The EMCS has a central operator station that includes a TI 112 CPU with a 40 megabyte hard drive, a cartridge tape data storage, a color monitor, a TI terminal printer, two dot matrix printers, and telephone modems. The EMCS has three work stations each consisting of a monitor, a telephone modem, and a dot matrix printer located at three remote sites from the central operator station.

Discussions with the EMCS operators at Fort Riley regarding the existing EMCS indicated the system is currently used to its capacity, is energy inefficient, and is technologically obsolete (failing).

1. COMPONENT ARMY	FY 1995 MILITARY CONSTRUCTION PROJECT DATA	2. DATE DEC 1995

3. INSTALLATION AND LOCATION
Fort Riley, Kansas

4. PROJECT TITLE Install Basewide Utility Monitoring Control System (UMCS)	5. PROJECT NUMBER

11. REQUIREMENT (continued)

Impact if Not Provided:

If this project is not funded, a reduction of 211,470 MBtu/yr (223,100,850 MJ/yr) cannot be achieved. The Army will not realize a $1,525,870 annual energy dollar savings with a 3.95 simple payback and a savings-to-investment ratio (SIR) of 2.3. Excessive amounts of natural gas and electricity will continue to be used, and there will be no contribution to energy reduction goals established for U.S. Army facilities by Army Headquarters.

Supporting Documentation:

Supporting data includes basic engineering calculations which show energy savings. The supporting data was documented and conducted under an Army contract performed by an A-E firm (E M C Engineers, Inc.) in FY 95.

Verification of Savings:

The Fort Riley Army facility uses existing electrical meters and natural gas meters which are read monthly by the local utility companies. Historic monthly electrical and natural gas use data are available and can be obtained for monthly billing periods. The energy use for billing periods prior to the installation of the UMCS can be compared to the energy use for billing periods subsequent to the UMCS installation.

Amount of Energy Conserved:

The amount of energy conserved is estimated to be 211,470 MBtu per year (223,100,850 MJ/yr).

APPENDIX A

SCOPE OF WORK AND CORRESPONDENCE

CEMRKED-MF

16 MAY 1994
REVISED 8 AUGUST 1994
REVISED 22 AUGUST 1994

APPENDIX "A"
CONTRACT NUMBER DACA01-94-D-0033
DELIVERY ORDER NO. 0001

GENERAL SCOPE OF WORK

FOR

FEASIBILITY STUDY FOR INSTALLATION OF

UTILITY MONITORING AND CONTROL SYSTEM (UMCS)

FORT RILEY, KANSAS

Performed as part of the

ENERGY ENGINEERING ANALYSIS PROGRAM (EEAP)

RAUG22

APPENDIX "A"
CONTRACT NUMBER DACA01-94-D-0033
DELIVERY ORDER NO. 0001

SCOPE OF WORK
FEASIBILITY STUDY
FOR
UMCS EXPANSION, FORT RILEY, KS

TABLE OF CONTENTS

ANNEXES

1. <u>BRIEF DESCRIPTION OF WORK</u>: The Architect-Engineer (AE) shall:

1.1 Review for general information the available design, construction, and operation data for the existing Energy Monitoring and Control System (EMCS).

1.2 Perform a limited site survey of selected buildings or facilities to verify construction features, electrical and mechanical equipment, occupancy, and mode of operation for energy analysis.

1.3 Evaluate the technical and economic feasibility of replacing the existing EMCS with a new distributed-process monitoring and control system (UMCS). The UMCS would use personal-computer-based central operator stations and remote control units as appropriate in the 27 buildings currently served by the existing EMCS. Not all of the buildings on the EMCS have DDC controls.

1.4 Evaluate UMCS applications programs (software) for all buildings or facilities using data from similar buildings to determine their energy savings potential and economic feasibility for connection to the new UMCS.

1.5 Provide complete programming or implementation documentation for all recommended projects.

1.6 Prepare a comprehensive report to document the work performed, the results and the recommendations.

2. <u>GENERAL</u>

2.1 The existing EMCS is a Johnson Controls, Inc. JC/85/40 system and has been in operation since 1985. Twenty-seven buildings are currently connected. This study is intended to evaluate replacement of the existing EMCS with a new PC-based UMCS, and to evaluate adding new buildings to the UMCS. All buildings shall be prioritized according to simple payback and need.

2.2 The information and analysis outlined herein are considered to be minimum essentials for adequate performance of this study.

2.3 For the purposes of this scope of work, an Energy

Conservation Opportunity (ECO) is defined as the application of one or more UMCS energy conservation programs (applications software) within a particular building or facility. A project is defined as the connection of one or more buildings/facilities to the UMCS or replacement of the existing EMCS.

2.4 The AE shall ensure that all ECOs which will reduce the energy consumption or cost of operation of the installation have been considered and documented per the detailed scope of work. The ECO's are limited to the standard UEMCS applications listed in TM5-815-2. A list of UMCS applications programs (software) to be used when evaluating specific buildings or facilities is included in TM5-815-2, "Energy Monitoring and Control Systems (EMCS)". Some of the applications programs listed in TM5-815-2 may not be applicable to the specific building or facility being evaluated; in such cases, a statement to that effect is all that is required.

2.5 The study shall include the energy consuming buildings or facilities listed in the Detailed Scope of Work, Annex A. Field work and calculations may be reduced somewhat by building repetition.

2.6 Computer modeling will be used to determine the energy savings of ECOs for typical buildings. The typical buildings are listed in the Detailed Scope of Work, Annex A. The results of these calculations may be applied to buildings which are similar to the typical buildings. This will be done by extrapolating on the basis of floor area. To be considered similar, a building must be essentially identical to the typical building in size, floor plan, mechanical equipment, type of construction, and occupancy. If a building is identical to a typical building in all respects except that the occupancy has been changed (e.g., a barracks converted into offices) the building should not be considered similar. In some cases, differences in physical orientation may not allow buildings to be treated as similar; but it is anticipated that in most cases, physical orientation will not be a significant factor. Modeling will be done using a professionally recognized and proven computer program or programs that integrate architectural features with air-conditioning, heating, lighting and other energy-producing or consuming systems. These programs will be capable of simulating the features, systems, and thermal loads of the building under study. The program will use established weather data files and may perform calculations on a true hour-by-hour basis or may condense the weather files and the number of calculations into several "typical" days per month. The Detailed Scope of Work, Annex A,

lists programs that are acceptable to the Contracting Officer. If the AE desires to use a different program, it must be submitted for approval with a sample run, an explanation of all input and output data, and a summary of program methodology and energy evaluation capabilities. The AE shall model 20 different typical occupancy/HVAC combinations for the purpose of developing extrapolation constants. Energy savings will be extrapolated to similar systems using the methods developed by the AE which use the equations from CR 82.030 and energy constants from modeling of typical systems. The AE shall calculate building loss coefficients of 80 typical buildings and shall extrapolate the building loss coefficients to the remaining buildings based on occupancy type and floor area. This requirement to use computer modeling for typical buildings applies only to heated and air conditioned or air-conditioned-only buildings which exceed 8,000 square feet or heated-only buildings in excess of 20,000 square feet. For buildings that are not covered by this requirement, the AE may use spread-sheet or manual calculations based on the standardized energy savings calculations presented in Appendix C (CR82-030) of Naval Facilities Engineering Command document number UG-0010, "User Guide for Single Building Controllers".

2.7 Cost estimates for all UMCS hardware, software, data transmission media (DTM), testing and other required UMCS services shall be made using CEHND-SP-90-244-ED-ME, "Energy Monitoring and Control Systems (EMCS), Large and Medium Configurations, Cost Estimating Guidelines", modified to reflect current market conditions. Quotations from the manufacturer of the existing system will be acceptable.

2.8 The "Energy Conservation Investment Program (ECIP) Guidance", described in letter from DAIM-FDF-U, dated 10 JAN 1994, establishes criteria for ECIP projects and shall be used for performing the economic analyses of all ECOs and projects. Construction cost escalation for DD Form 1391 submission shall be calculated using the guidelines contained in AR 415-17 and the latest Tri-Service MCP Index. The cost estimator is being computerized. A new cost estimator version is being prepared on disk with current cost data for cost estimates for umcs studies and designs. The AE shall use the new version. The Tri-Service MCP Index, when updated, is contained in the latest applicable edition of the Engineer Improvement Recommendation System (EIRS) bulletin.

2.9 Energy conservation opportunities determined to be technically and economically feasible shall be developed into projects acceptable to installation personnel. This may involve

combining similar buildings/projects into larger packages which will qualify for ECIP or OMA funding, and determining, in coordination with installation personnel, the appropriate packaging and implementation approach for all feasible ECOs. Not more than 5 DD Forms 1391 will be prepared.

2.10 Projects which qualify for ECIP funding shall be identified, separately listed, and prioritized by the Savings to Investment Ratio (SIR).

2.11 All feasible non-ECIP projects shall be ranked in order of highest to lowest SIR.

3. PROJECT MANAGEMENT

3.1 Project Managers. The AE shall designate a project manager to serve as a point of contact and liaison for work required under this contract. Upon award of this contract, the individual shall be immediately designated in writing. The AE's designated project manager shall be approved by the Contracting Officer prior to commencement of work. This designated individual shall be responsible for coordination of work required under this contract. The Contracting Officer will designate a project manager to serve as the Government's point of contact and liaison for all work required under this contract. This individual will be the Government's representative.

3.2 Installation Assistance. The Commanding Officer at each installation will designate an individual who will serve as the point of contact for obtaining information and assisting in establishing contacts with the proper individuals and organizations as necessary to accomplish the work required under this contract.

3.3 Public Disclosures. The AE shall make no public announcements or disclosures relative to information contained or developed in this contract, except as authorized by the Contracting Officer.

3.4 Meetings. Meetings will be scheduled whenever requested by the AE or the Contracting Officer for the resolution of questions or problems encountered in the performance of the work. The AE and/or the designated representative(s) shall be required to attend and participate in all meetings pertinent to the work required under this contract as directed by the Contracting Officer. These meetings, if necessary, are in addition to the presentation and review conferences.

3.5 Site Visits, Inspections, and Investigations. The AE shall visit and inspect/investigate the site of the project as necessary and required during the preparation and accomplishment of the work.

3.6 Records

3.6.1 The AE shall provide a record of all significant conferences, meetings, discussions, verbal directions, telephone conversations, etc., with Government representative(s) relative to this contract in which the AE and/or designated representative(s) thereof participated. These records shall be dated and shall identify the contract number, and modification number if applicable, participating personnel, subject discussed and conclusions reached. The AE shall forward to the Contracting Officer within ten calendar days, a reproducible copy of the records.

3.6.2 The AE shall provide a record of requests for and/or receipt of Government-furnished material, data, documents, information, etc., which if not furnished in a timely manner, would significantly impair the normal progression of the work under this contract. The records shall be dated and shall identify the contract number and modification number, if applicable. The AE shall forward to the Contracting Officer within ten calendar days, a reproducible copy of the record of request or receipt of material.

3.7 Interviews. The AE and the Government's representative shall conduct entry and exit interviews with the Director of Engineering and Housing before starting work at the installation and after completion of the field work. The Government's representative shall schedule the interviews at least two weeks in advance.

3.7.1 Entry. The entry interview shall thoroughly describe the intended procedures for the survey and shall be conducted prior to commencing work at the facility. As a minimum, the interview shall cover the following points:

a. Schedules.

b. Names of energy analysts who will be conducting the site survey.

c. Proposed working hours.

d. Support requirements from the Director of Engineering and Housing.

3.7.2 Exit. The exit interview shall include a thorough briefing describing the items surveyed and probable areas of energy conservation. The interview shall also solicit input and advice from the Director of Engineering and Housing.

4. SERVICES AND MATERIALS. All services, materials (except those specifically enumerated to be furnished by the Government), labor, superintendence and travel necessary to perform the work and render the data required under this contract are included in the lump sum price of the contract.

5. PROJECT DOCUMENTATION. All energy conservation opportunities or projects which the AE has considered shall be included in one of the following categories and presented in the report as such:

5.1 ECIP Projects. An ECIP project is one that proposes new construction or a retrofit of an existing facility for the purpose of conserving energy. In an ECIP project, savings may come from energy, demand, operations and maintenance, or a combination of the above. To qualify as an ECIP project, an ECO or project must have a construction cost estimate greater than $300,000, a Savings to Investment Ratio greater than or equal to 1.25 and a simple payback period of less than ten years. The AE shall check with the installation for guidance. The overall project and each discrete part of the project shall have a SIR greater than 1.25. For all projects meeting the above criteria, complete programming documentation will be required. Programming documentation shall consist of a DD Form 1391, and life cycle cost analysis summary sheet(s) with necessary backup data to verify the numbers presented. A life cycle cost analysis summary sheet shall be developed for each ECO and for the overall project when more than one building are combined.

5.2 Non-ECIP Projects. Projects which normally do not meet ECIP criteria, but which have an overall SIR greater than 1.25 shall be documented. The life cycle cost analysis summary sheet shall be completed for all ECOs or projects. Each shall be analyzed to determine if it is feasible even if it does not meet ECIP criteria. For ECOs or projects in this category, the life cycle cost analysis summary sheet, completely filled out, with all the necessary backup data to verify the numbers presented, a complete description of the project and the simple payback period shall be included in the report. Additionally, these projects shall have the necessary documentation prepared, in accordance

with the requirements of the Government's representative, for one of the following categories:

a. O & M Energy Projects: An O & M Energy project is one that results in needed maintenance or repair to an existing facility, or replaces a failed or failing existing facility, and also results in energy savings. The criteria are similar to the criteria for ECIP projects, i.e., $ 300,000 construction cost, SIR > 1.25, and simple payback period of less than ten years. In addition, if the project would replace a system or equipment that is considered 'failed or failing' due solely to obsolete technology or inefficiency, the equipment to be replaced must have been in use for at least three years; and the simple payback period must be three years or less.

b. Low Cost/No Cost Projects. These are projects which the Director of Engineering and Housing can perform using his resources.

5.3 Nonfeasible ECOs. All buildings/facilities which the AE has considered but which are not feasible for connection to the new UEMCS shall be documented in the report with reasons and justifications showing why they were rejected.

6. DETAILED SCOPE OF WORK. The detailed Scope of Work is contained in Annex A.

7. WORK TO BE ACCOMPLISHED.

7.1 Review Data for Existing EMCS. The AE shall review for general information the construction drawings and specifications and the manufacturer's drawings and operations and maintenance manuals for the existing EMCS. This review should acquaint the AE with the details of the hardware and software used in the existing system. Much of the information the AE may need to perform his evaluations will be contained in this data.

7.2 Perform a Limited Site Survey. The AE shall determine, based on information provided by the installation, which buildings are "typical" and which are "similar" as defined in paragraph 2.6. A limited field survey of all buildings listed in the detailed scope of work shall be conducted to verify and/or adjust the list of "typical" and similar" buildings. A detailed field investigation will then be made of all "typical" buildings using the outline provided in the detailed scope of work. The AE shall document his site survey on forms developed for the survey and submit these completed forms as part of the report. Testing

is not required.

7.3 Evaluate ECOS/Projects. The ECOs and projects identified in paragraphs 1.3 through 1.6, shall be analyzed in detail to determine their feasibility. Savings-to-Investment Ratios (SIRs) shall be determined using current ECIP guidance. The AE shall provide all data and calculations needed to support these analyses. All assumptions shall be clearly stated. Calculations shall be prepared showing how all numbers in the ECO were figured. Calculations shall be in an orderly step-by-step progression from the first assumption to the final number. Descriptions of the products, manufacturers catalog cuts, pertinent drawings or sketches, and input/output (I/O) summary sheets shall also be included. A life cycle cost analysis summary sheet shall be prepared for each ECO or project and shall be included as part of the supporting data. Provide a LCCID summary for each recommended project developed.

7.4 Provide Programming or Implementation Documentation. For projects or ECOs developed during this study, complete programming or implementation documentation shall be prepared by the AE.

7.4.1 Programming Documentation. For buildings or projects which meet ECIP criteria and which the installation wants to submit as an ECIP project, complete programming documentation shall be prepared. Complete programming documentation consists of DD Form 1391, and supporting data. These forms shall be separate from the narrative report. They shall be bound similarly to the final report in a manner which will facilitate repeated disassembly and reassembly. Not more than five 1391's shall be furnished.

7.4.1.1 Military Construction Project Data (DD Form 1391). These documents shall be prepared in accordance with AR 415-15 and the supplemental requirements in Annex B. A complete DD Form 1391 shall be prepared for each project. The form shall include a statement that the project results from an EEAP study. Documents shall be complete as required for submission to higher DA headquarters. These programming documents will require review and signatures by the proper installation personnel. All documents shall be completed except for the required signatures. The Installation will enter the Forms into the DD 1391 processor.

7.4.2 Implementation Documentation. For feasible projects or ECOs which do not meet ECIP criteria, implementation documentation shall be prepared. Each feasible project or ECO

shall be individually packaged, fully documented, and included as a separate section in the volume containing the programming documentation. Each project or ECO shall have a complete description of work to be done, economic justifications, sketches, I/O summary sheets, and other backup data included as a section in the report. The documentation required will be as determined by the Government's representative. Documentation required will be in the categories listed in paragraph 5.2. For low cost/no cost projects which the Director of Engineering and Housing personnel can perform, the following information shall be provided:

a. Brief description of the project.

b. Brief description of the reasons for the modification.

c. Specific instructions for performing the modification.

d. Estimated dollar and energy savings per year.

e. Estimated manhours and labor and materials costs. Costs shall be calculated for the current calendar year and so marked. Manhours shall be listed by trade.

Separate sheets for each project showing the above information shall be prepared and included in the report.

7.5 Submittals, Presentations and Reviews. The work accomplished shall be fully documented by a comprehensive report. The report shall have a table of contents and be indexed. Tabs and dividers shall clearly and distinctly divide sections, subsections, and appendices. All pages shall be numbered. The AE shall give a formal presentation of all but the final submittal to installation, command, and other Government personnel. The AE shall prepare slides or view graphs showing the results of the study to date for his presentation. During the presentation, the personnel in attendance shall be given ample opportunity to ask questions and discuss any changes deemed necessary to the study. A review conference will be conducted the same day, following the presentation. Each comment presented at the review conference will be discussed and resolved or action items assigned. The AE shall provide the comments from all reviewers and written notification of the action taken on each comment to all reviewing agencies within three weeks after the review meeting. It is anticipated that each presentation and review conference will require approximately one working day. The presentation and review conferences will be at the installation on the date(s)

agreeable to the Director of Engineering and Housing, the AE and the Government's representative. The Contracting Officer may require a resubmittal of any document(s), if such document(s) are not approved because they are determined by the Contracting Officer to be inadequate for the intended purpose.

7.5.1 Interim Submittal. An interim report shall be submitted for review after the field survey has been completed and an analysis has been performed on all of the ECOs. The report shall indicate the work which has been accomplished to date, illustrate the methods and justifications of the approaches taken and contain a plan of the work remaining to complete the study. I/O summary sheets and calculations showing energy and dollar savings and SIRs of all ECOs/projects shall be included. The simple payback period of all ECOs/projects shall be calculated and shown in the report. The AE shall submit the Scope of Work and any modifications to the Scope of Work as an appendix to the report. A narrative summary describing the work and results to date shall be a part of this submittal. During the review period, the Government's representative shall coordinate with the Director of Engineering and Housing and provide the AE with direction for packaging or combining ECOs for programming purposes and also indicate the fiscal year for which the programming or implementation documentation shall be prepared. A sample implementation document (DD Form 1391, sketches and manufacturers data, I/O summary sheets, life cycle cost analysis summary sheet and supporting data) for one project shall be submitted with this submittal for review and approval. The survey forms completed during this audit shall be submitted with this report. The survey forms only may be submitted in final form with this submittal. They should be clearly marked at the time of submission that they are to be retained. They shall be bound in a standard three-ring binder which will allow repeated disassembly and reassembly of the material contained within.

7.5.2 Prefinal Submittal. The AE shall prepare and submit the prefinal report when all sections of the report are complete. The AE shall submit the Scope of Work for the installation studied and any modifications to the Scope of Work as an appendix to the submittal. The report shall integrate all aspects of the study. The report shall list the recommended projects in order of descending SIR. The synergistic effects of all of the applications programs proposed for any particular building shall have been determined and the results of the original calculations adjusted accordingly. Completed programming and implementation documents for all recommended projects shall be included. The programming and implementation documents shall be ready for

review and signature by the installation commander. The prefinal report, separately bound Executive Summary and all appendices shall be bound in standard three-ring binders which will allow repeated disassembly and reassembly. The prefinal submittal shall be arranged to include (a) a separately bound Executive Summary to give a brief overview of what was accomplished and the results of this study using graphs, tables and charts as much as possible (See Annex C for minimum requirements), (b) the narrative report containing a copy of the Executive Summary at the beginning of the volume and describing in detail what was accomplished and the results of this study, (c) appendices to include the detailed calculations and all backup material and (d) the programming and implementation documentation. A list of all projects and ECOs developed during this study shall be included in the Executive Summary and shall include the following data from the life cycle cost analysis summary sheet: the cost (construction plus SIOH), the annual energy savings (type and amount), the annual dollar savings, the SIR, the simple payback period and the analysis date. For all programmed projects also include the year in which it is programmed and the programmed year cost.

7.5.3 Final Submittal. Any revisions or corrections resulting from comments made during the review of the prefinal report or during the presentation and review conference shall be incorporated into the final report. These revisions or corrections may be in the form of replacement pages, which may be inserted in the prefinal report, or complete new volumes. Pen and ink changes or errata sheets will not be acceptable. If replacement pages are to be issued, it shall be clearly stated with the prefinal submittal that the submitted documents will be changed only to comply with the comments made during the prefinal conference and that the volumes issued at the time of the prefinal submittal should be retained. Failure to do so will require resubmission of complete volumes. If new volumes are submitted, they shall be in standard three-ring binders and shall contain all the information presented in the prefinal report with any necessary changes made. Detailed instructions of what to do with the replacement pages should be securely attached to the replacement pages.

ANNEX A

DETAILED SCOPE OF WORK

1. LOCATION

a. GENERAL DESCRIPTION. The Architect Engineer (AE) shall furnish all services, materials, supplies, labor, equipment, investigations, studies, and travel as required in connection with the feasibility study for the below identified project in accordance with the contract and all furnished instructions:

INSTALLATION	DESCRIPTION
Ft. Riley, Ks.	Installation of UMCS

b. The project consists of studying the feasibility of making the necessary modifications to connect the systems/buildings on the existing EMCS system to the new UMCS, and replacing the existing EMCS system with a new UMCS. The buildings to be included are listed at the end of this Detailed Scope of Work. The buildings that are currently on the existing SCADA and/or the existing Hospital EMCS are not included in this study.

2. AUTHORIZATION. The feasibility study for this project is authorized by Memorandum CEMP-ET, Subject: Energy Engineering Analysis Program (EEAP)-FY94 dated 7 December 1993. The AE shall make reference to this authority in the study.

3. STUDY INSTRUCTIONS. If the Design Manuals, Guide Specifications, and/or Project Engineering Instructions do not cover a specific condition in question, the AE shall contact the Contracting Officer before proceeding. If there is a conflict in Engineering Instructions or other reference data, such questions or conflicts should be brought to the attention of the Contracting Officer before proceeding.

4. THE INSTALLATION REPRESENTATIVE for this contract will be Mr. Keith Jevons, Project Manager, Directorate of Engineering and Housing, telephone number 913-239-2044. The Kansas City District Project Manager will be Mr. Robert Miller, telephone number 816-426-7348. The Authericed Representative of the Contracting Officer will be Mr. Michael Whitacre, telephone number 816-426-2781.

5. COMPLETION AND PAYMENT SCHEDULE: The following schedule shall be used as a guide in approving payments on this contract. The interim report for shall be due not later than 180 days after Notice to Proceed. The prefinal report shall be due not later than 30 days after the interim report review conference. The final report shall be due not later than 21 days after the prefinal review conference.

MILESTONE	PERCENT OF CONTRACT AMOUNT AUTHORIZED FOR PAYMENT
Entry Interview	10
Completion of Field Work	25
Receipt of Interim Submittal	75
Completion of Interim Presentation & Review	85

6. METHOD OF PAYMENT.

a. Title I. The AE shall prepare and submit to the US Army Engineer District, Kansas City, partial payment estimates in accordance with the attachment entitled "Instructions for Completion of ENG Form 93." All partial payments shall be based on work completed as of the 15th day of the report month and shall be submitted to the office of the Contracting Officer by the 18th day of the month. Payment under this contract, for which property or services are provided in a series of partial executions or deliveries, will be made within 30 days after receipt of an invoice which has been properly executed by the AE.

b. Additional Conferences. Payment for furnishing the services of technically qualified representatives to attend additional conferences, when so requested in writing by the Contracting Officer, will be made at a rate per hour for the discipline involved plus travel expenses computed in accordance with Government Joint Travel Regulations in effect at the time travel is performed and actual cost of transportation.

7. THE SIMULATION PROGRAMS acceptable for use in this study are listed below. Any substitutes must be submitted and approved as outlined in the basic scope of work.

a. Building Loads and System Thermodynamics (BLAST)

b. DOE 2.1D

c. Carrier E20 or Hourly Analysis Program (HAP)

d. Trane Air-Conditioning Economics (TRACE)

e. Beacon

8. A COMPUTER PROGRAM titled Life Cycle Costing in Design (LCCID) is available from the BLAST Support Office in Urbana, Illinois for a nominal fee. This computer program can be used for performing the economic calculations for ECIP and non-ECIP ECOs. The AE is encouraged to obtain and use this computer program or may use their in-house program. The BLAST Support Office can be contacted at 144 Mechanical Engineering Building, 1206 West Green Street, Urbana, Illinois 61801. Telephone number is (217) 333-3977 or (800) 842-5278.

9. FACILITY SURVEY

The Architect-Engineer (AE) shall conduct a survey of the buildings and building systems listed in accordance with Appendix B of TM 5-815-2 and as described herein. Each building/system shall be observed while operating. The DEH will provide keys to the survey teams and will allow surveys to be conducted after hours and on weekends for most buildings. This survey shall include and document the following items:

a. Nameplate information such as manufacturer, horsepower, voltage, current, and other required data shall be recorded for each piece of equipment to be included in the system.

b. Deleted.

c. Deleted.

d. Deleted.

e. Deleted.

f. Deleted.

g. Deleted

h. Deleted.

i. Preliminary routing and costs for the fiber optic DTM between buildings shall be indicated.

j. The AE shall note suspected asbestos locations. Sampling, testing and abatement are not included in this contract.

k. A water level alarm for basement mechanical rooms will be included in the UEMCS point list and cost estimate.

10. AUTOMATED REVIEW MANAGEMENT SYSTEM (ARMS).

a. The AE, as a part of this scope of work, shall interface with and utilize the Corps of Engineers Automated Review Management System for this project. The AE will receive one copy of CESPK-PAM 1110-1-2, AE Response Package (User's Manual) describing the communications software, optimum hardware requirements and access procedures. The necessary software is included with the manual. Minimum requirements are an IBM-XT or compatible computer system running DOS 3.0 or later, with 640 kilobyte (KB) RAM, at least a 20 megabyte (MB) hard disk and a 1200 or higher baud Hayes-compatible modem operating. Assistance can be received via a telephone hotline at 916-551-3126.

b. All design review comments and responses will be electronically transmitted from the Corps of Engineer, Missouri River Division, by the ARMS. Comments can be received at a personal computer in the AE's office by use of ARMS software and a modem over telephone lines. The comments reside on the Missouri River Division computer. The AE can then download the review comments, respond to the comments, upload the comments back to the Division computer and forward responses to the Project Manager.

11. GOVERNMENT-FURNISHED DATA.

a. "Energy Monitoring & Control Systems Technical Manual" TM 5-815-2/AFM 88-36/ NAVFAC DM 4.9

b. AR 415-15 Military Construction, Army (MCA) Program Development

c. AR 415-20 Project Development and Design Approval

d. Engineering Instructions (as applicable)

e. "EMCS Guide Specifications"

(1) CEGS 13810 - Energy Monitoring and Control System (EMCS) Large Configuration

(2) CEGS 13814 - Building Preparation for Energy Monitoring and Control Systems

(3) CEGS 13945 - Multi-Building Expansion of Energy Monitoring and Control Systems

(4) CEGS 16768 - Fiber Optics Data Transmission System

(5) CEGS 16935 -

f. "Site Survey Procedures for EMCS" HNDSP86-188-ED-ME

g. "User Guide for single building Controllers UG-0010

h. "EMCS Cost Estimating Guidelines" HNDSP90-244-ED-ME

i. Previous studies related to application of EMCS at this site (where applicable)

j. Latest Tri-Service Cost Index.

k. DAIM-FDF-U letter dated 10 January 1994, "Energy Conservation Investment Program (ECIP) Guidance".

12. SUBMITTAL REQUIREMENTS.

ORGANIZATION	COPIES REQUIRED (Correspondence);	Interim & Prefinal Review	(Final)
Commander 1st Infantry Division (Mech) & Fort Riley ATTN: AFZN-DE-E/ Mr. Jevons Building 408 Fort Riley, Kansas 66442-5000	(1)	3***	(3)
District Engineer U.S. Army Engineer District, Kansas City ATTN: CEMRKED-MF(MILLER) 700 Federal Building Kansas City, Missouri 64106	(1)	3***	(3)
Division Engineer U.S.Army Engineer Division Missouri River ATTN: CEMRDMP-A(Jagasits) 12565 W. Center Road Omaha, NE 68144-3869	(1)	3***	(1)
Commander H.Q. Forscom ATTN: AFPI-ENO/ Mr. Kapur Fort McPherson, Ga. 30330-6000	(1)	1	(1)
HQDA ODCSLOG ATTN: DALO-TSE (Maj. Wilson) Pentagon Washington, D.C. 20310-0561			(1)*
Commander U.S. Army Corps of Engineers ATTN: CEMP-ET (Mr. Gentil) 20 Massachusetts Avenue, NW Washington, DC 20314-1000		1*	(1)*

Commander U.S. Army Engineer District, Mobile ATTN: CESAM-EN-DM (Mr. Battaglia) P.O. Box 2288 Mobile, AL 36628-1000 Express Mail to be sent to: 109 Saint Joseph Street Mobile, AL 36602	(1)	1	(1)**
Commander U.S Army Engineer Division, Huntsville ATTN: HNDED-ME (Mr. Holland) P.O.Box 1600, West Station Huntsville, Al. 35807	(1)	3***	(1)
Commander U.S Army Logistics Evaluation Agency ATTN: LOEA-PL (Mr. Keath) New Cumberland Army Depot New Cunberland, PA. 17070-5007			(1)*

* Executive Summary only

** Complete copy of final report

*** Computer printout

BUILDINGS THAT ARE NOT NOW CONNECTED TO THE UEMCS SYSTEM
LISTED IN ORDER OF PRIORITY

BUILDING	OCCUPANCY	SQ FT	CONDITION	NOTE
7670	Dental Clinic	14,960	Fair	
7632*	Gymnasium	20,694	Fair	
7832	Gymnasium	20,694	Fair	
741	Maint Hanger Comb	38,898	Fair	
7665*	Dental Clinic	11,076	Fair	
602	Dental Clinic	11,557	Fair	
722	Flight Simulator	7,000	Poor	
724*	Flight Simulator	13,188	Good	
8063	Enl Pers Dine	18,313	Poor	
7024	Gymnasium	20,619	Fair	
223	Enlisted Barrack W/DAS	47,794	Poor	1
727*	Mnt Hanger Comb	36,172	Good	
7622	Bn Admin & Clrm	12,380	Fair	
7824	Bn Admin & Clrm	12,246	Fair to Good	
7836	Bn Admin & Clrm	12,246	Fair to Good	
6914*	Exc Main Retl	63,930	Fair	5, 9
7404	Enl Barracks W/O Dining	50,967	Fair	
7424	Enl Barracks W/O Dining	50,967	Fair	
6620	Commum Act Ctr	31,740	Fair	9
7108	Bn Admin & Clrm	12,527	Good	6
7109	Bn Admin & Clrm	13,535	Good	
7620	Bn Admin & Clrm	6,340	Fair	
7624	Bn Admin & Clrm	6,158	Fair	
8025	Bn Admin & Clrm	12,000	Poor	
8037	Bn Admin & Clrm	12,000	Poor	
7820	Bn Admin & Clrm	6,673	Fair	
8071	Rgt HQ Bldg	9,963	Poor	
817	Mnt Hanger Avum	40,061	Fair	
802	Bn Admin & Clrm	12,526	Good	
804	Rgt HQ Build	10,241	Good	
806	Comb AC-HTG Plant	1,000	Good	
808	Bn Admin & Clrm	12,526	Good	
810	Adm & Support Building	15,152	Good	
812	Adm & Support Building	23,559	Good	
814	Medical Facility	Not Listed	New	
7485	Bowling Alley	36,966	Very Poor	
7806	Bn HQ Bldg	13,493	Fair to Good	
223	Enl Bks W/DAS	47,794	Poor	1
500	Post HQ Building	65,453	Fair to Good	9
404	Enlisted Barrack W/DAS	35,718	Poor	1
853	Mnt Hanger Avum	48,112	Fair	
840	Vehicle Mnt Shop Org.	9,152	Good	

206	Theater W/O Dressing Rm	10,754	Poor	
200	Admin General Purp.	60,690	Fair to Good	9
7920	Veh Mnt Shop DS	124,553	Fair	
751	AC Pts & TOE ST	9,834	Fair	
210	Military Personel Building	58,448	Good	9
7243	Admin & Sup Bldg	17,829	Fair	
7285	Clothing Sales	17,042	Fair	
8069*	IN SW Pool/Gym	25,620	Fair	9
202	Physical Fitness Ctr.	51,307	Fair	
7630	Bn Admin & Clrm	6,158	Fair	
7638	Bn Admin & Clrm	6,158	Fair	
7270	Bn. HQ Bldg	6,130	Fair to Good	
6918	Skill Development Center	11,507	Good	
402	Enlisted Barracks W/AS	35,718	Poor	
409*	Enlisted Barracks W/AS	32,883	Poor	2
410	Enlisted Barracks W/AS	32,883	Poor	
411	Enlisted Barracks W/AS	32,883	Poor	
6940	Indoor Swimming Pool	23,347	Poor	3
7350	Veh Mnt Shop Org	21,345	Fair	
7500	Veh Mnt Shop Org	22,325	Good	9
7720	Veh Mnt Shop Org	22,325	Good	9
7740	Veh Mnt Shop Org	22,325	Good	9
7960	Veh Mnt Shop Org	20,245	Good	9
222	Admin Gen Purp	18,854	Fair	
7450*	Regimental HQ Bldg	9,850	Fair	
7636	Regimental HQ Bldg	9,850	Fair	
7033	Bn Hqt Building	4,083	Fair	
7866*	Theater w/ Dressing Rm.	11,098	Fair	
7834	Regimental HQ Bldg	9,904	Good	
8065	Clinic W/O Beds	3,848	Poor	
7520	Veh Mnt Shop Org	27,112	Good	9
7600	Veh Mnt Shop Org	17,163	Good	9
7780	Veh Mnt Shop Org	17,163	Good	9
7900	Veh Mnt Shop Org	20,943	Good	9
7940	Veh Mnt Shop Org	22,405	Good	9
301*	Finance Administration	32,947	Poor	
302	Finance Administration	16,138	Poor	
319	General Instruction Bldg	9,690	Poor	
8410	Veh Mnt Shop Org	73,233	Fair	
8330	Veh Mnt Shop Org	39,256	Fair	
8370	Veh Mnt Shop Org	26,876	Fair	
8380	Veh Mnt Shop Org	No Listing	Good	
7410*	Bn Admin & Clrm	12,599	Fair	
1980	Phys Fitness Center	24,968	Fair to Good	
610	Enlisted Barracks W/AS	29,004	Good	1
7305	App Instr Bldg	9,872	Fair	
405*	Admin General Purpose	10,778	Poor	

5800	Youth Center	No Listing	Good
6910	Exc Sp St Fac	2,525	Poor 9
7826	Clinic W/O Bed	3,841	Good
8021*	Adm & Support Building	23,676	Poor
8023	Adm & Support Building	23,676	Poor 4
8057	Adm & Support Building	23,676	Poor
8059	Adm & Support Building	23,676	Poor
512	Senior Enlisted Quarters	13,619	Poor 9
313	Civilian Personel Bldg	6,222	Fair
319	Civilian Personel Bldg	9,690	Fair
7602	Adm & Support Building	13,520	Fair
7608	Adm & Support Building	13,520	Fair
7652	Adm & Support Building	13,520	Fair
7658	Adm & Support Building	13,520	Fair
7802	Adm & Support Building	13,280	Fair
7808	Adm & Support Building	13,280	Fair
7852	Adm & Support Building	13,280	Fair
7858	Adm & Support Building	13,280	Fair
7432	Adm & Support Building	13,500	Fair
7264	Library Main	31,240	Fair
7626	Clinic W/O Beds	3,604	Fair
7826	Clinic W/O Beds	3,841	Fair
7086*	Unit Chapel	8,696	Poor to Fair
7865	Unit Chapel	8,718	Fair
7050	Enl Bk W/AS	39,675	Fair 9
7053	Enl Bk W/AS	39,675	Fair 9
403	Admin General (Design Prep)	18,151	Good 1
7034	Clinic W/O Beds	3,842	Fair
7739	Moving Target Sim Bldg	4,074	Poor
720	AF Ops Bldg	3,705	Fair
7031	Bn HQ Bldg	3,733	Fair
7046	Bn Classrooms	3,733	Fair
7604	Gen Inst Bldg	1,346	Good 6
7656*	Gen Inst Bldg	13,493	Good 6
5302*	Post Office	12,240	Fair
7245	Enlisted Personel Dine	13,998	Fair
214	Enlisted Barracks W/AS	35,821	Fair
227	Enlisted Barracks W/AS	32,303	Poor
7606*	Enlisted Personnel Dine	13,493	Fair
7654	Enlisted Personnel Dine	13,493	Fair
7804	Enlisted Personnel Dine	13,493	Fair
7854	Bn HQ Bldg	13,493	Fair
7856	Enlisted Personnel Dine	13,493	Fair
8010	Det Day Room	2,100	Poor
8046	Det Day Room	2,100	Poor
1470	AR Vehicle Maint. Shop	21,667	Fair
7212	Co. HQ Bldg	19,320	Good

7218	Bn. HQ Bldg	12,625	Good
7220	Co. HQ Bldg	18,870	Good
7048	Bn. HQ Bldg	2,604	Fair
7028	Bn Classrooms	3,733	Fair
7047	Bn. HQ Bldg	3,733	Fair
8008	Enlisted Barracks W/O Din	11,549	Poor
8014	Enlisted Barracks W/O Din	11,549	Poor
8040	Enlisted Barracks W/O Din	11,549	Poor
8048	Enlisted Barracks W/O Din	11,549	Poor
8050	Enlisted Barracks W/O Din	11,549	Poor
8054	Enlisted Barracks W/O Din	11,549	Poor
29	Red Cross Bldg	Not Government Owned	
6*	Post Chapel	6,230	Fair
3	Post Chapel	8,828	Fair
760	Bn HQ Bldg	7,364	Fair
727	Mnt Hangar Comb	36,152	Fair
509	Admin Gen Purpose	10,108	Good 9
8002*	Enlisted Barracks W/O Din	22,700	Poor
8006	Enlisted Barracks W/O Din	22,700	Poor
8012	Enlisted Barracks W/O Din	22,700	Poor
8020	Det Day Room	2,100	Poor
8038	Enlisted Barracks W/O Din	22,700	Poor
8042	Enlisted Barracks W/O Din	22,700	Poor
8052	Senior Enlisted Quarters	22,700	Poor
8056	Det Day Room	2,100	Poor
8044	Applied Inst Bldg	2,470	Poor
5000*	Fire Station	8,400	Very Poor
7610*	Enlisted Barracks W/AS	41,892	Fair to Good
7612	Enlisted Barracks W/AS	41,892	Fair to Good
7614	Enlisted Barracks W/AS	41,892	Fair to Good
7616	Enlisted Barracks W/AS	41,892	Fair to Good 9
7618	Enlisted Barcks W/O Din	41,892	Fair to Good 9
7642	Enlisted Barracks W/O Din	41,892	Fair 9
7644	Enlisted Barracks W/O Din	41,892	Fair 9
7646	Enlisted Barracks W/O Din	41,892	Good 9
7648	Enlisted Barracks W/O Din	41,892	Fair to Good 9
7650	Enlisted Barracks W/O Din	41,892	Good 9
7810	Enlisted Barracks W/O Din	41,843	Fair to Good
7812	Enlisted Barracks W/O Din	41,843	Fair to Good
7814	Enlisted Barracks W/O Din	41,843	Fair to Good
7816	Enlisted Barracks W/O Din	41,843	Fair to Good
7818	Enlisted Barracks W/O Din	41,843	Fair to Good
7842	Enlisted Barracks W/AS	41,843	Good
7844	Enlisted Barracks W/O Din	41,843	Good 1
7846	Enlisted Barracks W/AS	41,843	Good
7848	Enlisted Barracks W/O Din	41,843	Fair 1
7850	Enlisted Barracks W/AS	41,843	Good

7017	Bn HQ Bldg	2,604	Fair	
7215	Bn HQ Bldg	2,604	Fair	9
540	Officers Quarters Military	14,528	Good	9
541	Officers Quarters Military	18,083	Good	9
542	Officers Quarters Military	14,528	Good	9
723	Mnt Hangar Comb	21,640	Fair	
620	Officers Quarters Military	12,640	Good	1
621	Officers Quarters Trans.	10,723	Fair	2
27	Officers Quarters Military	38,146	Good	9
7036	Rgt Hqtr Building	10,010	Fair	9
5309	Guest House	23,784	Good	

Total SF to be added: 4,177,337

Note 1 Under renovation/design
Note 2 FY 95 OMA Design List
Note 3 Possible CERL Project
Note 4 1 Oct 94 convert 3 Co. admin to 1 Bn HQTR/HVAC changes to supply area
Note 5 AAFES building
Note 6 Single loop digital controllers installed
Note 7 If very tight humidity & temp constraints are not maintained in these buildings the contractor will shut computer equip. down and the Government is charged for all down time.
Note 8 I have been informed that the officers club has their own maintenance personnel and contractor.
Note 9 EMCS prepped
* = Typical Building

BUILDINGS THAT ARE NOW CONNECTED TO THE UEMCS

BUILDING	OCCUPANCY	SQUARE FT	EQUIP	QTY
203	Cavalry Museum	5,800	DSC REV C	1
205	Cavalry Museum	16,496	SLAVE	1
207	Cavalry Museum	8,278	DSC REV C	1
			SLAVE	2
211	Administrative	41,062	DSC REV C	1
253	Drug Abuse Center	11,122	DSC REV C	1
330	DEH Admin	14,913	FPU	1
364	UEMCS HQTRS	744	FPU	1
364	UEMCS HQTRS	744	DSC REV E	1
406*	CID BUILDING	10,390	DSC REV C	1
			SLAVE	1
615	IACH ENERGY PLT (FIBER OPT)	10,658	DSC REV E	2
615	IACH ENERGY PLT	10,658	DSC REV E	2
			SLAVE	5
650*	Cold Storage Facility	22,331	DSC REV C	1
652	Cold Storage Facility	8,167		
710	Tactial Equip Shop	2,173	DSC REV C	1
820	Tactial Equip Shop	20,564	DSC REV E	1
833	Aircraft Hanger	52,080	DSC REV C	1
			SLAVE	1
835	MAF Operations Building	19,470	DSC REV E	1
4010	Dental Clinic	15,587	DSC REV C	1
			SLAVE	1
5315	Morris Hill Chapel	19,748	DSC REV E	1
7210	CH Chiller Plant	4,320	DSC REV C	1
			SLAVE	1
8073	CH Energy Plant	4,070	FPU	7
8100	Consolidated Maintenance	224,927	FPU	6
8390	Tactial Equip Shop	24,755	DSC REV C	1
8300*	Veh Maint Shop Org	20,240	FPU	2
8320	Veh Maint Shop Org	20,240	FPU	2
8340	Veh Maint Shop Org	20,240	FPU	2
8360	Veh Maint Shop Org	39,428	FPU	3

Total area on existing EMCS = 651,164

Equipment Definitions;

FPU - Field Processing Unit

DSC - Digital System Controller (REV C - E)

Slave - Additional Field Interface Controller (FIC-101) without a processor (PCR-101) and a Control Display Board (CDB-101)

* = Typical Building

ANNEX B

REQUIRED DD FORM 1391 DATA

To facilitate ECIP project approval, the following supplemental data shall be provided:

a. In title block clearly identify projects as "ECIP."

b. Complete description of each item of work to be accomplished including quantity, square footage, etc.

c. A comprehensive list of buildings, zones, or areas including building numbers, square foot floor area, designated temporary or permanent, and usage (administration, patient treatment, etc.).

d. List references, and assumptions, and provide calculations to support dollar and energy savings, and indicate any added costs.

(1) If a specific building, zone, or area is used for sample calculations, identify building, zone or area, category, orientation, square footage, floor area, window and wall area for each exposure.

(2) Identify weather data source.

(3) Identify infiltration assumptions before and after improvements.

(4) Include source of expertise and demonstrate savings claimed. Identify any special or critical environmental conditions such as pressure relationships, exhaust or outside air quantities, temperatures, humidity, etc.

e. Claims for boiler efficiency improvements must identify data to support present properly adjusted boiler operation and future expected efficiency. If full replacement of boilers is indicated, explain rejection of alternatives such as replace burners, nonfunctioning controls, etc. Assessment of the complete existing installation is required to make accurate determinations of required retrofit actions.

f. Deleted

g. An ECIP life cycle cost analysis summary sheet as shown in the ECIP Guidance shall be provided for the complete project and for each discrete part included in the project. The SIR is applicable to all segments of the project. Supporting documentation consisting of basic engineering and economic calculations showing how savings were determined shall be included.

h. The DD Form 1391 face sheet shall include, for the complete project, the annual dollar and MBTU savings, SIR, simple amortization period and a statement attesting that all buildings and retrofit actions will be in active use throughout the amortization period.

i. The calendar year in which the cost was calculated shall be clearly shown on the DD Form 1391.

j. Deleted

k. Nonappropriated funded facilities will not be included in an ECIP project without an accompanying statement certifying that utility costs are not reimbursable.

l. Any requirements required by ECIP guidance dated 10 January 1994 and any revisions thereto. Note that unescalated costs/savings are to be used in the economic analyses.

m. The five digit category number for all ECIP projects except for Family Housing is 80000. The category code number for Family Housing projects is 71100.

ANNEX C

EXECUTIVE SUMMARY GUIDELINE

1. INTRODUCTION.

2. BUILDING DATA (types, number of similar buildings, sizes, etc.)

3. PRESENT ENERGY CONSUMPTION.

   o Total Annual Energy Used.

   o Source Energy Consumption.

Electricity	- KWH, Dollars, BTU
Fuel Oil	- GALS, Dollars, BTU
Natural Gas	- THERMS, Dollars, BTU
Propane	- GALS, Dollars, BTU
Other	- QTY, Dollars, BTU

   o Energy Consumption of the buildings in this study as compared to the basewide consumption.

4. HISTORICAL ENERGY CONSUMPTION.

5. REEVALUATED PROJECTS RESULTS.

6. ENERGY CONSERVATION ANALYSIS.

   o ECOs Investigated.

   o ECOs Recommended.

   o ECOs Rejected. (Provide economics or reasons)

   o ECIP Projects Developed. (Provide list)*

   o Non-ECIP Projects Developed. (Provide list)*

   o Operational or Policy Change Recommendations.

* Include the following data from the life cycle cost analysis summary sheet: the cost (construction plus SIOH), the annual energy savings (type and amount), the annual dollar

savings, the SIR, the simple payback period and the analysis date. For all programmed projects also include the year in which it is programmed and the programmed year cost.

7. <u>ENERGY AND COST SAVINGS.</u>

- o Total Potential Energy and Cost Savings.
- o Percentage of Energy Conserved.
- o Energy Use and Cost Before and After the Energy Conservation Opportunities are Implemented.

8. <u>ENERGY PLAN.</u>

- o Project Breakouts with Total Cost and SIR.
- o Schedule of Energy Conservation Project Implementation

EMC
ENGINEERS, INC.

2750 South Wadsworth Blvd. • Suite C-200
Denver, Colorado 80227-3400
(303) 988-2951 • Fax: (303) 985-2527

19 August 1994

Mr. Bob Miller
ED-MF
US Army Corps of Engineers
Kansas City District
700 Federal Building
Kansas City, MO 64106-2896

Re: DACA 01-93-R-0148
Fort Riley UEMCS Study

Dear Bob:

Enclosed is our revised fee proposal for the above referenced project. The fee is based on work defined by:

- Scope of Work dated 16 May 1994, revised 8 August 1994.
- Confirmation Notice No. 1, dated 3 May 1994.

We revised our fee proposal to reflect the deletion of the HVAC alternative investigation and the reduction of the number of buildings to be studied from 230 to 218. The resulting fee was still over the $150,000 delivery order limit. Therefore, we revised our technical approach to provide a high quality accurate analysis for under $150,000. Significant items in our technical approach include the following:

1. The SOW requires computer modeling of 111 typical buildings with extrapolation to the remaining buildings. CR 82.030 (referenced in the SOW) indicates extrapolations to similar buildings should be on the basis of square feet of floor area.

   However, investment costs and energy savings for UEMCS are calculated on an HVAC system basis, not on a building basis. A building is a collection of HVAC systems. For example, a barracks may have 12 identical multizone systems, fan coil HVAC systems for administrative spaces within the barracks, a single zone HVAC system for the dining room, and a heating and ventilating unit for the kitchen. The time spent for simulation of identical HVAC systems within a building and subsequent extrapolation to similar buildings on the basis for floor area without consideration of individual HVAC system type or parameters does not provide good accuracy.

   Much better accuracy is provided with less effort by modeling separately a single typical multizone barracks zone, a typical administrative space with a

fan coil, and a typical dining facility with a single zone HVAC system and H&V unit; and then extrapolating results to other similar HVAC systems on the basis of building loss coefficient for the zone, cfm, motor horsepower, percent ventilation air, and actual operating schedules.

We propose the latter approach. We have reviewed the building list and identified 14 occupancy types and 5 different HVAC system types likely to be encountered. From this list we expect 20 occupancy/HVAC combinations. We thus propose modeling 20 typical occupancy/HVAC combinations for the purpose of developing extrapolation constants. Our previous fee proposal was based on computer modeling of 26 typical buildings. For a similar study at Fort Leonard Wood in Missouri, 18 typical buildings were modeled.

2. The 20 typical occupancy/HVAC combinations for modeling will be determined by loading field data for all buildings into a database and then sorting by occupancy and system type to identify typical combinations.

3. UEMCS energy savings will be extrapolated to similar systems using the methods developed by EMC which use the equations from CR 82.030 and energy constants from modeling of typical systems. One of the extrapolation parameters is the Building Loss Coefficient (BLC) which must be calculated for each similar building. This is a very labor intensive procedure. We propose calculating BLCs of 80 typical buildings and extrapolating BLCs to the remaining buildings based on occupancy type and floor area.

4. We propose modeling typical systems using the DOE 2.1d building energy simulation model. This model is recognized as the standard for accurate modeling. Other software allowed by the SOW is much less accurate.

5. The analysis will be performed primarily using a database program based on spreadsheets developed for UEMCS analysis at EMCs Atlanta office. The calculations are well proven and greatly reduce the amount of manual analysis and reduce input errors.

We feel the above technical approach will provide much better quality than required by the SOW at an affordable price. We propose a fee of $149,336 to complete the project as defined above.

Please give me a call if you have any questions.

Sincerely,

E M C ENGINEERS, INC.

Dennis Jones

Dennis Jones

CONFIRMATION NOTICE

Confirmation No.:	2	EMC #1406-001
DATE:	November 2, 1994	
PROJECT:	Feasibility Study for Installation of UMCS Fort Riley, Kansas	
CONTRACT No.:	DACA 01-93-R-0148	
NOTES PREPARED BY:	Alan Niemeyer E M C Engineers, Inc.	
DATE OF CONFERENCE:	4 October 1994	
PLACE OF CONFERENCE:	Ft. Riley, Kansas	
SUBJECT:	Entrance Interview	
ATTENDEES:	Bob Miller, Kansas City COE, 816/426-7348, FAX 816/426-3690 Keith Jevons, PW Design, 913/239-2044, FAX 913/239-6678 Linda Eslinger, PW Energy, 913/239-6841, home 784-5141 Larry Stillwagon, PW, O&M, 913/239-2371 Ken Williams, PW, O&M, 913/239-8175, FAX 913/239-8188 Jim Roberts, PW Energy, 913/239-2210 Jayce Krause, PW, HVAC, 913/239-6315 Jack Olson, PW, HVAC, 913/239-2689 Jon Cranmer, PW, ERMD, MESB, 917/239-6942 Jeff York, PW EMCS, 917/239-3771 Bob Resner, PW Energy, 917/239-2210 Carl Lundstrom, EMC Engineers, 404/642-1864, FAX 404/552-6759 Dennis Jones, EMC Engineers, 303/988-2951, FAX 303/985-2527 Alan Niemeyer, EMC Engineers, 303/988-2951, FAX 303/985-2527	

The following is a summary of the items discussed, the comments and decisions made during the interview.

1. Keith Jevons (PW Design) started the meeting with an introduction of attendees and an explanation of the purpose of the UMCS project.

2. Dennis Jones (EMC) briefly discussed the purpose of the UMCS Study and the HVAC Upgrade Study.

3. EMC asked for contacts for specific information and were provided the following contacts:

General information	Linda Eslinger, PW Energy, 913/239-6841
HVAC	Jack Olson, PW, HVAC, 913/239-2689
Electrical Systems	913/239-3030 or 3832
Existing EMCS	Linda Eslinger, PW Energy, 913/239-6841 Larry Pipes, PW UMCS, 913/239-3371
Communication	Jon Cranmer, PW, ERMD, MESB, 917/239-6942

3. EMC was asked to keep Linda Eslinger informed as to which buildings were being surveyed.

4. Potential problems associated with asbestos-containing materials (ACM) and the installation of the UMCS were discussed. Keith Jevons indicated that most ACM had either been remediated or identified; but asked that we note any buildings with suspected ACM which had not been marked. The cost of ACM removal should be included in the budget for the UMCS installation. Daryl Wilson is the environmental contact for asbestos.

5. EMC asked about utility data information. The following contacts were suggested:

Energy sources and rates:	Steve Pientka, PW Utilities, 913/239-2371
EMCS network data:	G. Dennis Grossnickle, DOIM, 913/239-2524
Existing Communications:	Jon Cranmer, PW, ERMD, MESB, 917/239-6942

6. EMC asked about the general controls philosophy at Ft. Riley. The following points were discussed:

   - Typical UMCS functions include night setback, economizer control, and monitoring. Ft. Riley is interested in any UMCS functions which make sense, including duty cycling and demand limiting. Demand limiting is a viable function due to the demand ratchet. They are also interested in special UMCS functions for special use buildings such as museums and flight simulators.

   - Future controls for installation at Ft. Riley should be based on direct digital control (DDC) from the UMCS.

   - Ft. Riley indicated that evaluations should generally be based on indoor design temperatures of 76 F for cooling and 70 F for heating.

- There are 11 gas meters serving Ft. Riley. There are 3 electric substation meters. Metering should be included in the UMCS study recommendations.

- The UMCS installation should be kept flexible for computer control access. Several work stations should be included in the budget. The UMCS installation should be expandable for more computer control monitoring.

7. EMC discussed their approach for coordination of the UMCS and HVAC Upgrade studies. The HVAC Upgrade study will be nested inside the UMCS study. EMC will identify candidate buildings for the HVAC Upgrade study during the UMCS field survey. EMC will coordinate the HVAC Upgrade building list with Ft. Riley. The HVAC Upgrade study will be completed before completing the analysis of the UMCS study so that the results of the HVAC Upgrade study are incorporated into the UMCS study. EMC will coordinate and work closely with Ft. Riley throughout the course of the project. The ECIP project identified in these two studies should be in the 2 to 3 million dollar range, with a payback of 5 years or less.

8. EMC indicated that the two studies will require more than the 6 months to the interim submittal, as required by the SOW, due to coordination and sequencing of the two projects. Ft. Riley indicated that they have no scheduling constraints. EMC will submit a project schedule to Fort Riley after completion of the UMCS and HVAC Upgrade field surveys.

Alan Niemeyer

Alan Niemeyer

If any portion of this confirmation notice is incorrect, please notify us immediately. If correspondence is not received to the contrary within 14 days, it will be assumed that the decisions and conclusions, and status outlined in this confirmation notice is correct.

CONFIRMATION NOTICE

Confirmation No. 3 EMC #1406-001

DATE:	November 22, 1994
PROJECT:	Feasibility Study for Installation of UMCS Fort Riley, Kansas
CONTRACT No.:	DACA 01-93-R-0148
NOTES PREPARED BY:	Alan Niemeyer E M C Engineers, Inc.
DATE OF CONFERENCE:	19 October 1994
PLACE OF CONFERENCE:	Ft. Riley, Kansas
SUBJECT:	Exit Interview

ATTENDEES:	Linda Eslinger	PW Energy	913-239-6841
	Keith Jevons	PW Design	913-239-2044
	Jeff York	PW EMCS	917-239-3771
	John Mekis	EMC Engineers, Inc.	303-988-2951
	Alan Niemeyer	EMC Engineers, Inc.	303-988-2951

The following is a summary of the items discussed, the comments and decisions made during the interview.

1. Keith Jevons opened the meeting and introductions of those attending were made.

2. General observations of the UMCS field survey were presented by Alan Niemeyer and John Mekis. The general observations were as follows:

   - Access to buildings was generally easy. The Building Access Letter issued by Keith Jevons was very helpful.

   - The mechanical and controls drawings were generally accurate. Some copies of control shop drawings were obtained at individual buildings.

   - The Heating Season at Ft. Riley is between 1 Oct. and 15 May.

   - The Cooling Season at Ft. Riley is between 15 May and 1 Oct.

- Asbestos-containing materials (ACM) were observed in some mechanical rooms. Most of the ACM had been abated.

3. General observations for area buildings were presented by Alan Niemeyer and John Mekis. These observations were summarized as follows:

BLDG AREA	BLDG TYPE	MECH. & CONTROLS OBSERVATIONS
CUSTER HILL AREA	ENL. Barracks Battalion HQs Admin. & Supply	Fair to Poor condition Fair condition Fair to Poor condition
MARSHALL FIELD (Air Field Area)	Hangers and Maint. Shops Battalion HQs Admin. & Supply	Good condition Fair to Poor condition Fair to Poor condition
MAIN POST AREA	Various Admin. and Barracks	Fair condition

4. Alan Niemeyer indicated that some of the buildings in the Main Post area were under renovation and that mechanical and control system drawings would be needed to evaluate the new HVAC systems. The buildings under renovation include the following:

   - Bldg. 27 - Quarters
   - Bldg. 214 - ENL. Barracks
   - Bldg. 223 - Quarters
   - Bldg. 403 - Administration
   - Bldg. 5000 - Fire Station

5. Keith Jevons indicated that drawings for the buildings under renovation would be available at the Public Works Design Branch. Keith also mentioned that the following buildings were currently under renovation design:

   - Bldg. 206
   - Bldg. 409
   - Bldg. 411
   - Bldg. 610

6. Jeff York suggested that a recent survey of HVAC equipment done at Ft. Riley might be helpful for the UMCS Study. The survey included collecting the name plate for the HVAC equipment per building. The survey information was entered into a data base computer program.

Alan Niemeyer

Alan Niemeyer
Project Manager

Copies To: Tony Battaglia
Keith Jevons
Bob Miller
Larry Stillwagon
EMC file

If any portion of this confirmation notice is incorrect, please notify us immediately. If correspondence is not received to the contrary within 14 days, it will be assumed that the decisions and conclusions, and status outlined in this confirmation notice is correct.

EMC ENGINEERS, INC.

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Denver, Colorado 80227-3400
303/988-2951 • Fax: 303/985-2527

CONFIRMATION NOTICE

Confirmation Notice No. 4 EMC #1406-001

DATE: 11 July 1995

PROJECT: Feasibility Study for Installation of UMCS
CONTRACT NO.: DACA01-94-D-0033

NOTES PREPARED BY: Alan Niemeyer
E M C Engineers, Inc.

SUBJECT: Items discussed and agreed upon during telephone conversations on 30 January 1995 and 30 May 1995 between Larry Stillwagon, Fort Riley Public Works Energy Branch and Alan Niemeyer, EMC Engineers, Inc.

This confirmation notice serves to document discussions and agreements made and direction given to EMC Engineers, Inc. relating to the above project during telephone conversations between Larry Stillwagon and Alan Niemeyer.

1. Telephone conversation - 30 January 1995: Building 1980 was listed as a Physical Fitness Center in the Scope of Work building list. During the field survey, this building was found to be used as a recycle center (for paper, plastic, and metals), instead of a fitness center. It was agreed to remove Building 1980 from the list of buildings being evaluated in the UMCS Study.

2. Telephone conversation - 30 May 1995: Building 615 is the IACH Energy Plant that provides heating and cooling to Irwin Army Hospital, Building 600. A utility monitoring control system is currently scheduled to be installed in the hospital, and will also be extended to Building 615. It was agreed to remove Building 615 from the list of buildings being evaluated in the UMCS Study.

Alan J. Niemeyer

Alan J. Niemeyer
Project Engineer, E M C Engineers, Inc.

cc: David E. Werner, Kansas City District Corps of Engineers
Larry Stillwagon, Public Works Energy Branch, Fort Riley
File

If any portion of this Confirmation Notice is incorrect, please notify us immediately. If correspondence is not received to the contrary within 14 days, it will be assumed that the decisions, conclusions, and status outlined in this Confirmation Notice are correct.

EMCS SECTION
BLDG. 364
FT.RILEY, KS.

EMCS PREPED BLDGS.

OCTOBER 1994
PHONE 239-3771/2132

MAIN POST *SQUARE FOOTAGE*

200	PATTON HALL (ADMINISTRATIVE)	60,690
210	MILITARY PERSONNEL BLDG.	58,488
500	POST HQ BLDG.	65,453
509	ADMIN GEN PERPOSE	10,108
512	ENL BKS W/DINING	13,619
540	OFFICERS QTRS	14,528
541	OFFICERS QTRS	18,083
542	OFFICERS OTRS	14,528

CUSTER HILL

6620	COMMUNITY CTR.	31,740
6910	EXCHANGE SUPPORT FACILITY	2,525
6914	MAIN EXCHANGE	63,830
7004	ENL BK W/DAS	39,675
7007	ENL BK W/DAS	39,675
7010	ENL BK W/DAS	39,675
7013	ENL BK W/DAS	39,675
7036	RGT HQ BLDG	10,010
7050	ENL BK W/DAS	39,675
7053	ENL BK W/DAS	39,675
7500	VEH MNT SHOP ORG	22,325
7520	VEH MNT SHOP ORG	27,112
7616	ENL BKS W/AS	41,892
7618	ENL BK W/O DIN	41,892
7642	ENL BK W/O DIN	41,892
7644	ENL BK W/O DIN	41,892
7646	ENL BK W/O DIN	41,892
7648	ENL BK W/O DIN	41,892
7650	ENL BK W/O DIN	41,892
7656	GEN INST BLDG.	13,493
7720	VEH MNT SHOP ORG	22,325
7740	VEH MNT SHOP ORG	22,325
7760	VEH MNT SHOP ORG	17,163
7780	VEH MNT SHOP ORG	17,163
7900	VEH MNT SHOP ORG	20,943
7940	VEH MNT SHOP ORG	22,405
7960	VEH MNT SHOP ORG	20,245
8069	LONG GYM & IND POOL	25,620
8100	CONSOLIDATED MAINTENANCE (GAS FIRED UNITS INSTALLED)	224,927

March 20, 1995

TO: Alan Niemeyer
EMC Engineers, Inc.
2750 South Wadsworth Blvd. Ste. C-200
Denver, CO 80227-3400

FROM: Linda M. Eslinger
Public Works, Energy Branch
AFZN-PW-EE
408 Dickman Street
Fort Riley, KS 66442-6016
(913) 239-2371

Dear Alan,

Enclosed is a block diagram that shows the existing Fiber Optic Network on Fort Riley. I decided to send in the mail because it looks like it has been faxed one too many times already.

Also enclosed is a map of Custer Hill Troop Area showing the estimated location of the 5 future Fiber Optic Network Hubs which will be housed in some kind of utility shed or small building. The number of buildings to be connected is still being debated; if we get a list of buildings that will be connected, we will let you know. In the meantime, Larry Stillwagon wants you to calculate costs assuming running fiber to the hubs.

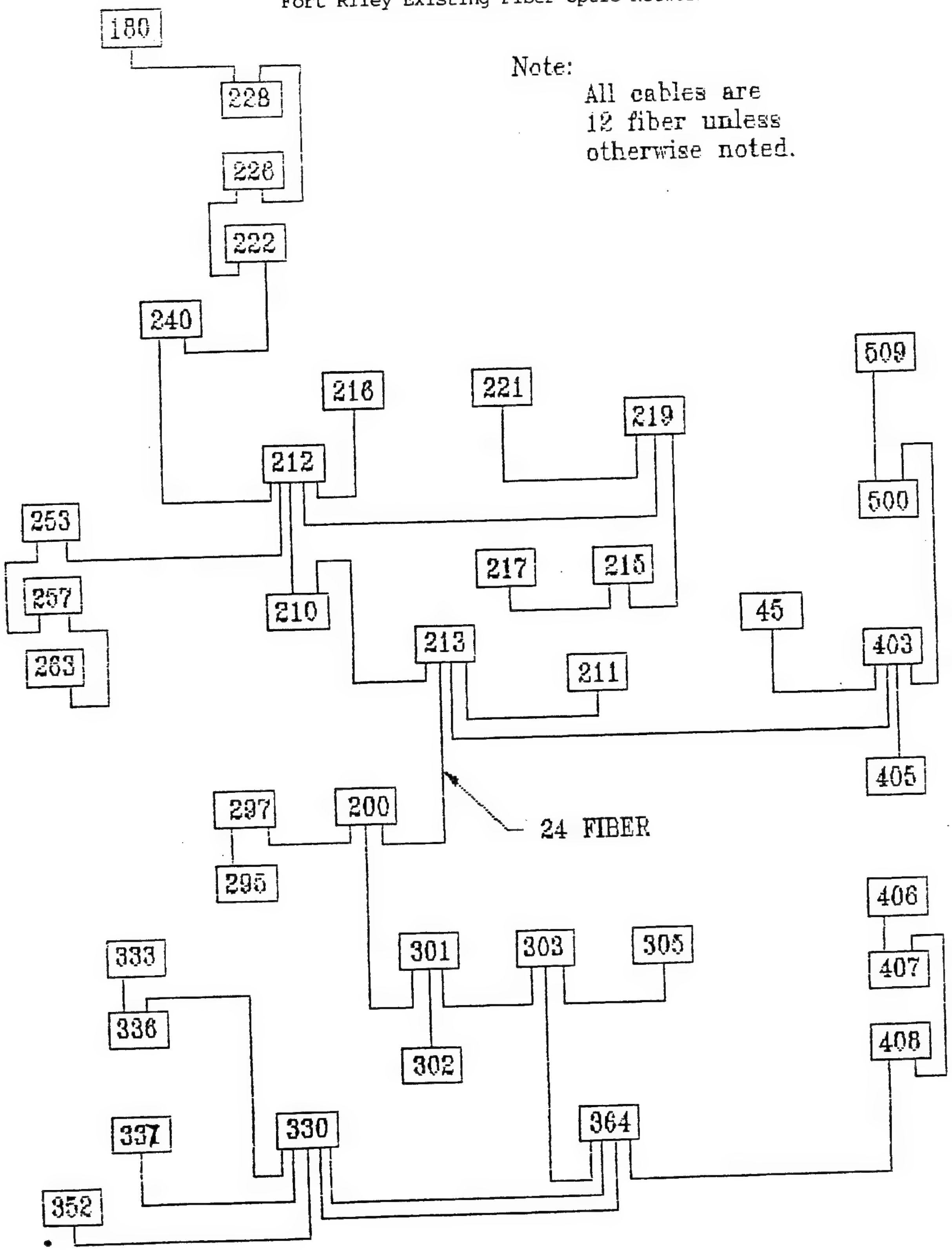
If you need measurements of distances of phone lines or just distances between buildings let me know and I will get you the information. We have moved; please note our new address.

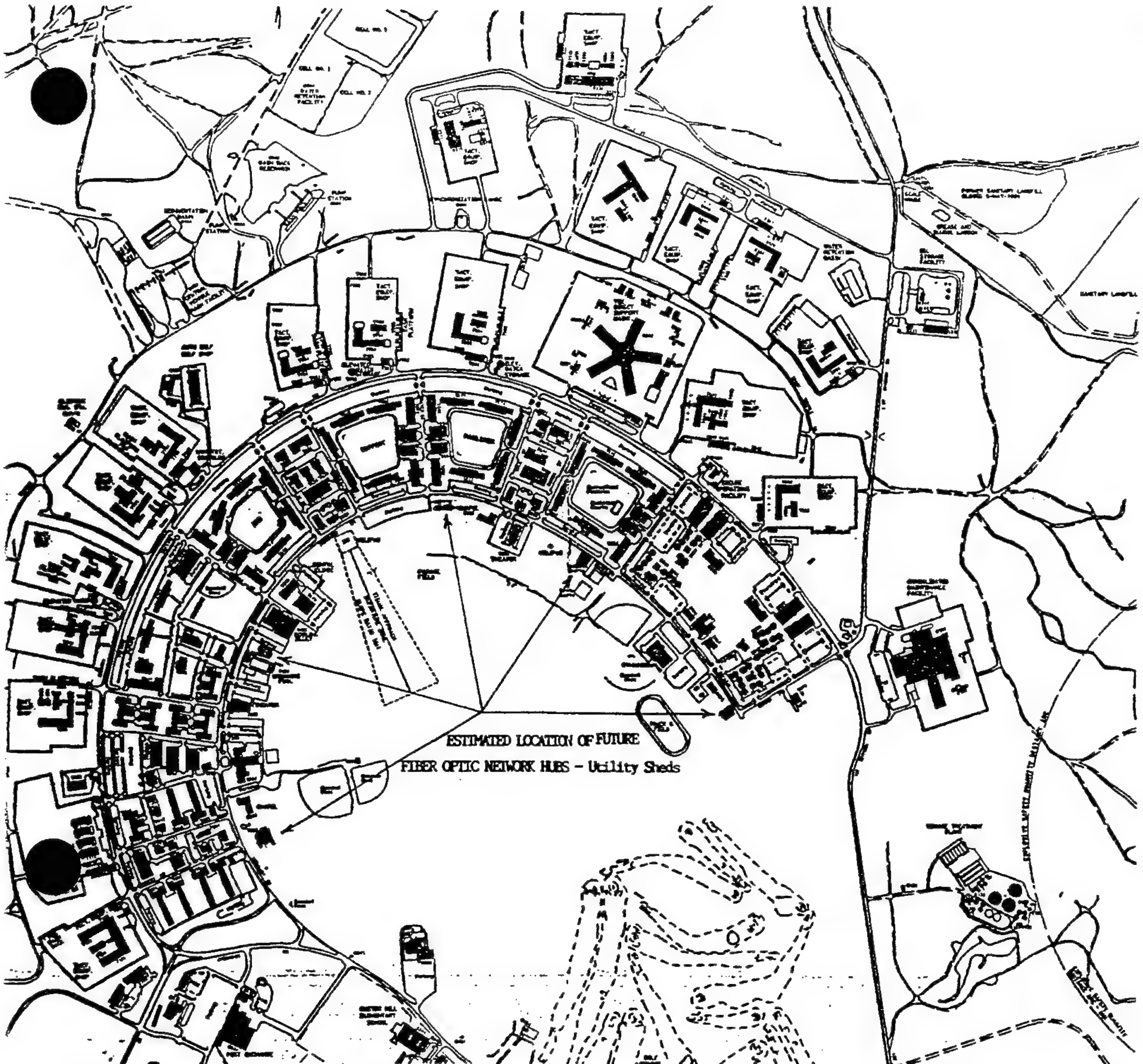
Sincerely,

Linda M. Eslinger

Linda M. Eslinger

Fort Riley Existing Fiber Optic Network





CUSTER HILL TROOP HOUSING AND SUPPORT

Microsoft Mail v3.0 IPM.Microsoft Mail.Note
From: Wildman, Jim
To: Nemeyer, Alan
Subject: ENERGY MONITORING SYSTEM
Date: 1995-06-26 10:49
Priority:
Message ID: 42F1C0B3
Conversation ID: 42F1C0B3

==

1. No dark optical fiber available between Custer Hill and Main Post.
2. Custer Hill optical fiber project will place 8.3/125 single mode fiber to the following buildings.

Buildings Scheduled for Optical Fiber Cable Installation

4010	7033	7253	7636	7854	8410
5000	7034	7264	7638	7858	
5202	7036	7270	7652	7920	
5302	7046	7305	7656	7958	
5306	7047	7410	7658	8021	
5309	7048	7432	7665	8023	
5800	7055	7450	7670	8025	
6620	7108	7604	7753	8037	
6918	7109	7608	7806	8044	
6940	7212	7620	7808	8057	
6950	7218	7622	7820	8059	
7026	7220	7624	7824	8065	
7028	7233	7626	7834	8071	
7031	7243	7630	7836	8100	

EMC ENGINEERS, INC.

2750 South Wadsworth Blvd. • Suite C-200
Denver, Colorado 80227-3400
303/988-2951 • Fax: 303/985-2527

CONFIRMATION NOTICE

Confirmation Notice No. 4 EMC #1406.001

DATE: 6 September 1995

PROJECT: Feasibility Study for Installation of UMCS, Fort Riley, Kansas

CONTRACT NO.: DACA 01-94-D-0033

NOTES PREPARED BY: Alan Niemeyer, E M C Engineers, Inc.

DATE OF MEETING: 31 August 1995

PLACE OF MEETING: Fort Riley, Kansas

SUBJECT: Interim Submittal Presentation and Review Conference

ATTENDEES:

David E. Werner	Kansas City District Corps of Engineers	(816) 426-2094
Larry Stillwagon	Public Works Energy, Fort Riley	(913) 239-2371
Robert Seltzer	Public Works Energy, Fort Riley	(913) 239-2371
Keith R. Jevons	Public Works Design, Fort Riley	(913) 239-2044
Larry Pipes	Public Works EMCS, Fort Riley	(913) 239-3771
Jim Roberts	Public Works Controls, Fort Riley	(913) 239-3771
Carl Lundstrom	EMC Engineers, Inc.	(770) 642-1864
Alan Niemeyer	EMC Engineers, Inc.	(303) 988-2951

The presentation of the Interim Submittal for the Feasibility Study for Installation of UMCS was given by Alan Niemeyer and Carl Lundstrom of EMC Engineers. The presentation included highlights from Sections 1 through 7, and a review of a the project results and conclusions.

Review comments were received for the Interim Submittal from the following organizations:

- U.S. Army Engineer District, Kansas City, Mo.

- Fort Riley Public Works Energy Branch
- U.S. Army Engineer District, Mobile, AL
- U.S. Army Engineer District, Huntsville, AL

The review comments were discussed and resolved during the course of the meeting. The responses to the review comments are as follows:

Comments from Richard Beyer:

1. Comment #1. Annotation: DISAGREE. Buildings 253, 7108, 7432, 7604, and 7656 7612 are reported in the field survey data to have functional time clocks. Building 8380 was under construction at the time of the field survey and somehow the time clocks were overlooked as part of the field survey data.

   Larry Stillwagon agreed with EMC's findings. Mr. Stillwagon said the time clocks are not maintained due to lack of manpower. Even the SLDC panel time clocks are not operating with the correct schedules. EMC should assume that the time clocks are not working.

2. Comment #2. Annotation: CONCUR. The field survey data for Building 8380 was taken from existing drawings, as the building was under construction at the time of the field survey. EMC will review the field survey data for this building and make corrections.

3. Comment #3. Annotation: CONCUR. EMC will delete the duty cycling energy savings from the study as directed by Larry Stillwagon.

4. Comment #4. Annotation: DISAGREE. In most cases, the entire building was not modeled in the computer simulation, only a portion of the building served by the HVAC system. In EMC's opinion, the energy use for the buildings seem reasonable for the existing HVAC systems and their operation. The energy use in buildings can be verified with utility billing data, although this information is not readily available for individual buildings.

   Larry Stillwagon questioned what is the "energy budget" and what is the "allowable amount". David Werner questioned if EMC was being to general with the reported building energy use. Larry Stillwagon said the building energy use reported in the computer simulations is satisfactory.

5. Comment #5. Annotation: INFO. No, thermisters were not used in the study. The manufacturer's cut sheet for a thermister sensor will be removed.

6. Comment #6. Annotation: INFO. The Scope of Work indicated that fiber optic data transmission media (DTM) should be evaluated between buildings. Larry Stillwagon agreed that the study should include the fiber optic DTM.

7. Comment #7. Annotation: INFO. The DOIM group at Fort Riley is in-charge of the telecommunications system. They have indicated that the existing fiber optic network cable will soon be upgraded. This upgrade was in the design stage while estimates for the fiber optic DTM were being made for this study. For the purposes of this study, new fiber optic DTM was estimated for the installation of the UMCS.

   Larry Stillwagon agreed that estimating new fiber optic DTM for the UMCS is valid, as it represents the worst case cost of the system. It is unknown whether fiber optic DTM would be available when the UMCS is ready for construction.

Comments from Larry Stillwagon, Fort Riley Public Works Energy Branch:

8. Comment #1. Annotation: INFO. Wording about obtaining a maintenance contract for UMCS hardware and software will be deleted. The following wording will be added: Staffing requirements for operation and maintenance of the UMCS will be determined by Fort Riley. The cost for maintenance is estimated to be approximately 8% of the total field hardware material costs.

9. Comment #2. Annotation: CONCUR. "DEH" will be changed to "PW".

10. Comment #3. Annotation: CONCUR. Name of Building 330 will be corrected.

11. Comment #4. Annotation: CONCUR. "Lighting" will be changed to "lightning".

12. Comment #5. Annotation: CONCUR.

13. Comment #6. Annotation: CONCUR. A brief discussion of the existing and proposed fiber optic system being installed at Fort Riley will be included. The UMCS and telephone system could share resources. This decision would need to be made at the time of the UMCS design. A new fiber optic network is currently being designed and installed in the Main Post and Custer Hill areas at Fort Riley. The information that EMC received from the DOIM group indicated that additional FO cable for a UMCS was not being considered in their design (probably due to budgetary constraints). A percentage of spare fiber will be included in new FO cable installation, but it is unknown whether this fiber would be available for the UMCS when the UMCS is installed. For planning and budgeting purposes, new FO cable was estimated for installation of the UMCS.

14. Comment #7. Annotation: CONCUR. The decision to contract out maintenance or perform the maintenance in-house should be left up to the Installation. This will be included in Section 4.5.2 along with how the cost for the maintenance is estimated.

15. Comment #8. Annotation: CONCUR. Sentence will be corrected.

16. Comment #9. Annotation: CONCUR. Typo will be corrected.

17. Comment #11. Annotation: INFO. According to the information received from the DOIM group, they will only authorize concrete-encase conduit for installation of new FO cable where it currently does not exist. EMC estimates include routing FO cable through existing conduit duct banks, as well as the installation of new concrete-encased conduit between buildings where none exist.

    Larry Stillwagon questioned whether the concrete-encased conduit is necessary. He will contact the DOIM group to determine if only a conduit could be installed.

18. Comment #12. Annotation: INFO. The 20% cost adjustment is a minimum estimate.

    Larry Stillwagon said that EMC should remove Alternative No. 1 from the study and make a qualitative discussion why Alternative No. 1 was reviewed, but removed from the study. EMC agreed, Alternative No. 1 will be removed from the next submittal.

19. Comment #13. Annotation: CONCUR. Work stations will include both alarm and log printers.

20. Comment #14. Annotation: CONCUR. The workstations, as identified, will be shown on the UMCS block diagram and their costs included in the estimates.

21. Comment #15. Annotation: INFO. Yes.

22. Comment #16. Annotation: CONCUR. The LCCA form will be changed.

23. Comment #17. Annotation: INFO. See Item 18, Comment #12 above. Discussion about sole source contracting will not be included in the next submittal.

24. Comment #18. Annotation: CONCUR. Correction will be made.

25. Comment #19. Annotation: CONCUR. Corrections will be made.

26. Comment #20. Annotation: CONCUR. Correction will be made.

27. Comment #21. Annotation: INFO. In Appendix F, Table F-1 lists the buildings with their HVAC systems.

28. Comment #22. Annotation: INFO. Larry Stillwagon would like EMC to add a reset control on the DHW tank, to reset DHW temperature. EMC agreed to add this to the study, with energy savings based on sample energy calculations provided by Larry Stillwagon.

29. Comment #23 Annotation: CONCUR. Water level alarms will be included in the UMCS point list and cost estimate.

30. Comment #24. Annotation: CONCUR.

31. Comment #25. Annotation: CONCUR. Control points for VAV boxes will be added to the I/O summary table and cost estimate. Additionally, EMC will add verbiage to the study clarifying that the purpose of the new UMCS installation includes replacing the existing pneumatic controls with DDC controls.

32. Comment #26. Annotation: CONCUR. Correction will be made.

33. Comment #27. Annotation: CONCUR. Correction will be made.

Comments from Robert S. Woodruff, EN-DM, Mobile District, AL.:

34. Comment #1. Annotation: INFO. Alternative No. 1 has higher costs for controls hardware and labor reflecting what generally happens with sole source contracts; Alternative No. 2 costs reflect leaving the existing EMCS in-place and installing a new UMCS for all additional buildings; and Alternative No. 3 costs reflect installing a new UMCS for all buildings, replacing the existing EMCS.

    Larry Stillwagon said EMC should add a qualitative discussion about the Alternative No. 1 sole source contract (see Item #18, Comment #12 above) and the study should only include one alternative for a new UMCS that replaces the existing EMCS.

35. Comment #2. Annotation: INFO. Yes.

36. Comment #3. Annotation: INFO. The Cold Storage Facilities must maintain cold temperatures at specific temperature setpoints. The equipment used to provide the

refrigeration has controls specifically designed for its service. We evaluated monitoring this equipment and leaving the existing refrigeration controls in-place. Larry Stillwagon agreed that the Cold Storage Facilities should be monitored, but not controlled by the UMCS.

37. Comment #4. Annotation: INFO. Building 1980 is a temporary building and is World War II vintage. It is currently on a list to be demolished. EMC was directed by Larry Stillwagon to remove this building from the feasibility study. This information will be added to the writeup on page 2-10.

    Larry Stillwagon also stated that the central plant buildings 7210 and 8073 should be removed from the energy savings analysis of this study.

38. Comment #5. Annotation: INFO. The calculation sheet for the demand charge is included in Appendix E, Section E3. The $23.37 per kW is calculated using a demand limiting spread sheet provided by Fort Riley Public Works Energy Branch. The demand limiting spread sheet uses existing facility data and rate structures. The $23.37 is based on an annualized kW, not a monthly kW.

39. Comment #6. Annotation: INFO. Yes, it is included in the LCCA.

40. Comment #7. Annotation: INFO. See Item #3, Comment #3.

41. Comment #8. Annotation: INFO. The enthalpy economizer compared to a temperature economizer could save additional energy, but only a small amount of additional savings would be seen. Humidity sensors are maintenance intensive. For this reason, temperature economizers are more cost effective and were evaluated in this study.

42. Comment #9. Annotation: INFO. The manhours shown in this schedule are the minimum amount of hours estimated for savings. These manhours savings are for the entire year and are based on typical maintenance activities for each HVAC system. EMC will add a brief discussion for Table C-7.

43. Comment #10. Annotation: INFO. A kW signal is not necessary for the this system type or the demand limiting function of the UMCS. The TM 5-815-2 EMCS technical manual does not include DDC type controls. The I/O summary tables are typical for the Fort Riley Installation.

Comments from R.W. White, Jr., U.S. Army Engineer District, Huntsville, AL.:

44. Comment #1 Annotation: INFO. Fort Riley is considering how the UMCS should be staffed and will be looking at the future operation of the UMCS. Fort Riley is not anticipating any new personnel requirements.

45. Comment #2. Annotation: INFO. See Item #44, Comment #1 above.

46. Comment #3. Annotation: INFO. Electrical energy savings for the pumps supplying hot water to the radiant slabs were calculated. The UMCS functions such as Start/Stop, Optimum Start/Stop, and Night Setback apply to these pumps. The heating savings were not included due to the difficulty of estimating the quantity saved.

47. Comment #4. Annotation: CONCUR.

48. Comment #5. Annotation: CONCUR. The importance of properly maintained and tight fitting outside air dampers will be included.

49. Comment #6. Annotation: See discussion in Item #18, Comment #12 above.

50. Comment #7. Annotation: CONCUR.

51. Comment #8. Annotation: CONCUR. Correction will be made.

52. Comment #9. Annotation: INFO. The humidity sensor is not used to control humidity in the space, but is used for a high limit on the chilled water reset so the space humidity does not get too high when the chilled water is reset.

53. Comment #10. Annotation: INFO. The day-night setback application should be remain. It is used in conjunction with the AHU.

54. Comment #11. Annotation: INFO. The presentation is accurate, but could also be presented as combined. EMC will revise the presentation.

55. Comment #12. Annotation: INFO. The Optimum Start/Stop and the Day/Night Setback relate to the fan control. EMC will include additional points for control of the VAV boxes. See Item #31, Comment #25 above.

56. Comment #13. Annotation: INFO. This is a good idea. EMC will change the I/O summary table, but not change the cost. The cost is almost the same cost for a differential pressure switch versus a current transducer.

57. Comment #14. Annotation: CONCUR. These pages will be reviewed and corrections made.

58. Comment #15. Annotation: CONCUR. The failure mode strategy will be checked on the I/O summary tables.

59. Comment #16. Annotation: INFO. This study evaluates only a portion of all the buildings at Fort Riley. One of the buildings evaluated in this study utilized ventilation fans for building temperature control. Exhaust fans interlocked with make-up air units were included with the make-up air unit evaluations.

60. Comment #17. Annotation: CONCUR. The unit cost column was misapplied. The dollars/manhour will be input instead of the total unit cost for the item.

61. Comment #18. Annotation: CONCUR. See Item #60, Comment #17 above.

62. Comment #19. Annotation: INFO. The January through June should be 1993. This was verified by Larry Stillwagon.

63. Comment #20. Annotation: INFO. No, the point costs do not include a portion of the overall system cost. The point costs include only the field point hardware costs. Costs for RCUs and ACUs are included in the building summary cost tables. Costs for the front-end computers, software, training, etc. are included for the overall project.

Alan J. Niemeyer

Alan J. Niemeyer
Project Engineer, E M C Engineers, Inc.

Attachments: Written Government Comments

Action Required: Larry Stillwagon will provide EMC with information on the installation of underground DTM, whether it should be concrete-encased or not concrete-encased; and will provide energy savings information on a domestic hot water controller.

cc:

David E. Werner	Richard Beyer	Robert S. Woodruff	Tony Battaglia
Naresh K. Kapur	Ken Arrington	R. W. White	Larry Stillwagon
Keith R. Jevons	Carl Lundstrom	File	

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Ft. Riley EMCS Feasibility Study

File: N:\RV\PROJECTS\RILFEAS.DBF

Num	Name	Office	Page/Sheet	Discipline	Rm/Detail
1	BEYER	ED-DL	GEN	ELE	

I could not find a single building in the field survey data that had a time clock that worked. Is this really true -- that not a single time clock on the entire post works? I would think that at least some of the newer buildings would have functional time clocks, in fact, I know the time clocks in building 8380 work. Since, as is stated in the study (Volume I, Appendix B, paragrapg B.1.1), most of the potential for energy savings comes from scheduled start/stop of systems that are unnecessary during unoccupied hours this could skew the study.

Num	Name	Office	Page/Sheet	Discipline	Rm/Detail
2	BEYER	ED-DL	GEN	ELE	

The field survey data indicates that building 8380 has no meters but it actually has gas and electric meters. Many of the newer buildings on the post should have meters and most of them should have pulse initiators. Please verify your field data. Building 8380 in known to have a humidifier and several dual speed motors that don't appear in your field survey data,

Num	Name	Office	Page/Sheet	Discipline	Rm/Detail
3	BEYER	ED-DL	GEN	ELE	

Appendix B, page B-1, paragraph B.1.2 states that duty cycling will reduce the heating and cooling loads by reducing the quantity of outside air admitted when the fan is off. This strategy directly violates ASHRAE Standard 62. Duty cycling shall not be used on air handlers that introduce outdoor air into a building while occupied.

Num	Name	Office	Page/Sheet	Discipline	Rm/Detail
4	BEYER	ED-DL	GEN	ELE	

The energy budgets for all buildings look consistenly high, up to four times the allowable amount in some cases. Please verify the energy budgets. This may be in part due to the 24 hour per day assumption made for all of the buildings because the field data shows no functional time clocks.

Num	Name	Office	Page/Sheet	Discipline	Rm/Detail
5	BEYER	ED-DL	GEN	ELE	

Appendix E has included a cut sheet of a thermistor temperature sensor. Are these being used somewhere in this project instead of platinum RTD's?

Num	Name	Office	Page/Sheet	Discipline	Rm/Detail
6	BEYER	ED-DL	GEN	ELE	

Has anyone considered the use of dial-up modems in lieu of fiber optic runs?

Num	Name	Office	Page/Sheet	Discipline	Rm/Detail
7	BEYER	ED-DL	GEN	ELE	

Is there any possibility of using existing fiber runs that were installed as part of the telecommunications system and aren't being utilized?

PW **Public Works Fort Riley, Kansas** Engineering Review Comments	To: CEMRK-EP-DI
Plans & Specifications or Draft: ☒ Concept ☐ Final ☐ ______	Project: UMCS FEASIBILITY STUDY (EEAP)
Designed by: ☒ A/E ☐ KCD ☐ In-house	Suspense Date: 21-Aug-95
Comments by: L. Stillwagon / Office: PW-EE	Date: 28-Aug-95

Reference	Item No.	Comments	Action
ES-6	1	Your comments on the Fort Riley Support should address staffing requirements for operation and maintenance of the UMCS. How it is staffed and what is contracted out are decisions to be made by the Installation. You can include estimates on in-house vs contract costs, and what they are based on.	
General	2	"DEH" should be changed to "PW"	
2-1 and 2-5	3	Bldg. No. 330 is now named "PW ADMIN"	
4-3, Section 4.3	4	"lighting" should be "lightning	
4-4	5	"utilizes uses" should be "utilizes" or "uses", not both.	
Section 4.3	6	Why is there no discussion of the existing and proposed FO system being installed at Fort Riley? Is it possible for the UMCS and phone system to share resources, or are you saying a separate system should be installed?	
4-5, 4.5.2	7	The decision to contract out maintenance is best left to the Installation. If there is a requirement for less than one man-year, one man-year, or more than one man-year of labor to maintain the system, it may be less expensive for the Government to perform all or a portion of the work in-house and contract out something like grass mowing.	
5-1, 5.1	8	Second paragraph first line - "complexed" should be "complex"	
5-1, 5.1	9	Third para fifth line - "avings" should be "savings"	
5-4, 5.4	11	Why is the Fiber Optic (FO) cost estimate based on installation in a concrete encased electrical conduit. The conduit only needs to be approved for FO, it does not need to be encased in concrete.	
General	13	All work stations should have alarm and log printers.	

Page 1

5-5 & 5-6	12	Where did the 20% cost adjustment come from? Is this based on previous experience with Johnson Controls on other Government Sole Source contracts?	
General	14	The location and number of workstations needs to be changed. The COS will be in Bldg 364 as listed, but the workstations should be in the following Bldgs: 240, 330, 337, 366, 408, and 7210	
5-5	15	Does the 6% of hardware cost used for 1st year maintenance contract include labor and expendable items only. The 1st year is covered by warranty, but what about future years? Are the materials covered in the later years in LCC calculations?	
6-26, 27, & 28	16	The Life Cycle Cost Analysis Form used for these analyses is the old form. There is no $/MBTU or corresponding MBTU/YR savings. The newer form just uses annual savings and Discount Factor for Demand Savings.	
7-1, 7.1	17	Your summary statement that JCI would charge less for a competitive bid should be documented somewhere in the report. Maybe your report should just address whether or not there is justification for going sole source and what would be in the best interest of the Government.	
C-16, C.6	18	"Building occupied 0700-1800 (8 hrs/day" should it be "11 hrs/day"?	
C-16, C.5	19	26 wks and 44 wks don't match the 32 wks and 20 wks identified in 1st paragraph.	
C-19, C.7	20	"chiggers" should be "chillers"	
Appendix D	21	Provide a Table, by Bldg #, that shows which system types are included.	
D-9	22	Some of the small stm boilers are used for domestic hot water only and you are showing Application programs like Day/night Setback, Scheduled & Optimum Start/Stop (Ex. 7610). If you are recommending resetting the domestic hot water temperature during periods of low use (a good idea) you will need to include water temperature AI hardware. We have used that type of control system in barracks before, and it does save energy.	
Appendix A, page 17	23	I haven't been able to find the water level alarm for basement mechanical rooms on any of the I/O Summary Sheets. Para 9.k.	
Appendix A, page 26	24	DSC Note should read "(PCR-102)" not "(PCR-101)"	

D-43	25	I/O Summary Tables do not list VAV boxes in the BLDG. Ex: BLDG 301 has 20 VAV boxes that use pneumatic controls; they do NOT work properly. We waste energy because we can NOT maintain temperatures. The original scope of work for this project (whate we wanted) was to study the feasibility of replacing failing and unmaintainable pneumatic control systems with DDC systems connected to a COS for energy management and to reduce maintenance calls.	
D-18, 0512	26	Should this be CV-1?	
D-66	27	"Return Fa" should be "Return Fan"	

FACSIMILE TRANSMITTAL HEADER SHEET

For use of this form, see AR 25-11; the proponent agency is ODISC4

	COMMAND/ OFFICE	NAME/ OFFICE SYMBOL	OFFICE TELEPHONE NO. (AUTOVON/Comm.)	FAX NO. (AUTOVON/Comm.)
FROM	USAED, MOBILE, AL	Tony Battaglia CESAM-EN-DM	(334) 690-2618	(334) 690-2424
TO:	USAED, Kansas City	Dave Werner CEMRK-ED-DI	(816) 426-2597	(816) 426-3690

CLASSIFICATION	PRECEDENCE	NO. PAGES (Including this Header)	DATE-TIME	MONTH	YEAR	RELEASER'S SIGNATURE
U	N	2	23 12:00	08	95	Anthony W. Battaglia

REMARKS

Space Below For Communications Center Use Only

DA FORM 3918-R, JUL 90 DA FORM 3918-R, AUG 72 IS OBSOLETE

Dave,

Attached are Bob Woodruff's comments on the UMCS Feasibility Study for Fort Riley. I would also like to get some from Eric Auyang in our instrumentation group, if I can catch him in the office. If not, this will be all I can get for you.

Tony B.

MOBILE DISTRICT PROJECT REVIEW COMMENTS:		DATE: 22August 1995	Page 1 of 1
TO: U. S. Army Corps of Engineers Kansas District		FROM: Robert S. Woodruff, CESAM-EN-DM Phone: (334) 694-6074 FAX: (334) 690-2424	
PROJECT/FY: Feasibility Study for Installation of UMCS			
LOCATION: Fort Riley, Kansas			
TYPE REVIEW: Interim Report			

NO.	Page/Par	COMMENT	Response to Comment
1	ES-3	Why do the three alternatives produce such different results when essentially they are three ways of doing the same thing ?	
2.	ES-5	Why is the Total Investment Cost for Alternative 1 so much more than Alternative 3 ? Is this caused by the sole source supplier ?	
3	2-8	The Cold Storage Facilities (Buildings 650 and 652) were not modeled for energy savings. Please explain why not.	
4	2-10	Building 1980 was not a viable candidate for UMCS, why not ?	
5.	2-11	The demand charge of $23.37 per KW looks high. Please verify this figure.	
6.	4-5	Paragraph 4.5.2 recommends that the equipment be maintained by the supplier. Is the cost to do this included in the life cycle cost ?	
7.	B-1	Are the buildings being properly ventilated during duty cycling ?	
8.	B-3	Would the economizer cycle save more if it were controlled by enthalpy instead of temperature ?	
9.	C-18	Is there any basis for the manhours shown in this schedule ?	
10.	D-27	Without a KW signal how does the computer determine the amount of power being consumed by this unit ? The I/O Summary Tables for several of the typical systems seem to vary from those shown in TM 5-815-2 the Army Energy Monitoring and Control Systems Technical Manual.	

Engineering Review Comments

Project: UMCS Feasibility Study for Fort Riley (EEAP)

Contract Number: DACA01-94-D-0033

Comments by: R.W. White, Jr.

Date: 17 August 1995

Overall Summary:

Generally, this appears to be a clear, well organized, and concise analysis. Substantial survey detail and energy calculations are present to support conclusions and recommendations. The professionalism and engineering judgement exhibited through this work reflect well on EMC Engineers, Inc.

Please address the following questions and concerns:

1. Page ES-6, Fort Riley Support. Need to elaborate to identify new personnel requirements (e.g. 2 full-time employees for 8 hours/day or additional employees for 16 hours/day system operation).

2. Page ES-6. Suggest you recognize that there is a need for a dedicated UMCS manager and recommend that the installation establish and staff the position.

3. Page 2-8. How did you extrapolate energy use and savings from the representative maintenance building to buildings with radiant floor slabs (Bldg# 817, 833, etc.)?

4. Page 4-3. Nice discussion of the advantages of fiber optic DTM in section 4.3.

5. Page 4-6. Perhaps you can include the importance of properly maintained and snug fitting outside air dampers in section 4.7.

6. Page 5-5. Please supply justification for the 20% increase in costs associated with a new JC Metasys.

7. Page 6-2. Excellent presentation of economic summary data in Tables 6-1 thru 6-3.

8. Page C-19. "..thousands of combinations of chiggers..." can be an awesome sight!

9. Page D-27. A "common" outside air temperature sensor is understood to be one or more sensors somewhere in the field that share their data throughout the system. How does that idea apply to a "common" space humidity sensor? If you intend to monitor the humidity within the space served by those typical chillers, remove the "common" designation and group the function with the space. As a general rule, I do not recommend monitoring humidity unless it is in a critical space that has tight environmental requirements.

10. Page D-29. Remove the day-night setback application or add a temperature sensor.

11. Page D-37. Recommend you combine zones 1-5 with space 1-5. If zone 1 serves space 1 they are essentially the same for the I/O table.

12. Page D-43. You show optimum start/stop and day-night setback for spaces 1-5 but I don't see associated control points. How do you regulate the temperatures in the individual zones?

13. Page D-45. Consider using a current transducer to monitor the large motors (15 hp and up) instead of a differential pressure switch. Some argue that it allows enhanced diagnostic capabilities.

14. General. There are some loose dots at the bottom and/or failure mode symbols floating around on D-69, 73, 77, 81, 83, 91, 95 and 99.

15. General. Check the failure mode strategy. Do we want air conditioning to fail ON?

16. Page D-84. Can there be only one ventilation fan that qualifies for UMCS control in all of Ft. Riley?

17. Appendix E. There is some confusion about the total manhours column. Is this really the total manhours necessary to complete that line item? If so, we would prefer to see a labor charge in dollars per manhour for each discipline if possible. Please clarify.

18. Page E1-7. Please explain the labor cost. Where do those numbers come from?

19. Page E3-1. Should January through June be 1994 or is this all one year?

20. Page F-13. Table F-1 looks to be very useful in determining which functions on each unit offer the best payback. Do the point construction costs include a portion of the overall system costs?

PW, FORT RILEY, KS
ENERGY BRANCH

FACSIMILE TRANSMISSION COVER SHEET

TO: NAME: Alan Niemeyer

LOCATION: EMC Engineers, Inc.

FAX NO: 303-985-2527

DATE: 5 September 1995

NUMBER OF PAGES (INCLUDING COVER PAGE): 5

FROM: NAME: Larry Stillwagon

PHONE NO: 913-239-2371

FAX NO: 913-239-6678
CONFIRMATION NO: 913-239-2718

MESSAGE:
The attached Memo For Record is the analysis that I did for the PRO-TEMP domestic hot water controller. The analysis for the difference in MCF/DAY between Bldg 7812 and 7818 showed a savings of $654.16/year (218 MCF natural gas/year). That was based on a natural gas price of $3.00/MCF. 7812 & 7818 are 41,843 SF rolling pin style barracks. I think this type control would be a good idea if it was connected to an EMCS, so the water temperature could be monitored and the control could be overridden if it needed to be.

~~I'm still looking~~ into the concrete ~~encased Fiber Optic conduit.~~ I'll let you know as soon as I ~~get an Official~~ answer.

Ron, Haynes, says to plan on interduct (minimum of 1") with a factory installed pulling lanyard. plowed in. ~~with Fiber~~ You can add additional for some trenching, if you have a lot of fibers in an area.

AFZN-DE-EE (420)

MEMORANDUM FOR RECORD 13 September 1990

SUBJECT: PRO-TEMP Water Heater Controller Economic Analysis

1. The computer printout from PRO-TEMP for building 7818 after 104.7 days showed a savings of 3899 therms/month (Encl 1) which equates to $1,169.70/month or a payback of 2.8 months on the $3,274 controller. In an effort to determine if the actual payback would be that quick on the PRO-TEMP Water Heater Controllers I asked CERL to include buildings 7812, 7818, 7842, and 7850 in their meter reading work.

2. Based upon the summer month readings for buildings 7812 and 7818 it appears that the simple payback for the PRO-TEMP controller, used in a rolling pin style barracks, would be five years not 2.8 months (Encl 2). I included the information on buildings 7842 and 7850 to determine if the MCF/Day values were reasonable.

3. The reason I used the cost of $3,274 for the unit and not the estimated installed cost of $4,000 was that George Eads said that these units were being installed as repair and the balance of costs would have been used to repair the old system. If these units were to be installed on working systems the total installed cost of $4,000 would have to be used in the economic analysis and the simple payback would be 6.1 years.

4. Based upon the fact that the PRO-TEMP unit payback is in excess of 3 years the installation of these units would not be recommended under the current guidance from Higher Headquarters. I'm not saying they are a bad idea and I do think the additional units we have purchased should probably be installed, if the working units haven't become maintenance problems. I know that there was no Engineer in the Energy Office when this project was developed but in the future this office should get involved in determining what the payback will be when energy savings are included.

5. A very interesting outcome of this analysis was that when we adjusted the operation of the Domestic water heater boiler in building 7812 the projected savings was over $1,000/year (Encl 3). It took approximately 15 minutes to do this and we used a combustion analyzer similar to the unit that CERL is purchasing for us with the recycling money we sent them. The cost of the unit at $3,150 will be returned by adjusting only three boilers of an equivalent size to the domestic water heater boiler in building 7812.

Larry Stillwagon

LARRY STILLWAGON
Chief, Energy Section, Engineering Div
Directorate of Engineering and Housing

CF:
DEH
Engineering Div, Chief
Maintenance Div, Chief
Environmental Div, Chief

PRO-TEMP 8000AT
Water Heater Controller
Installation Data

Peak Street Energy

LOCATION:

Name:	Ft. Riley Bldg. 7818
Type:	Barracks
City & State:	Ft. Riley, Kansas
File Name:	FtR7818
Time:	13:03:38
Date:	07-25-1989
Version:	4.16

SYSTEM ANALYSIS

Loop Recirculation Rate Estimate:	45.4 gallons/minute	
Stand-by Heat Loss:	1 %	72 therms/month
Heater Demand First 7 Days:	65.7 %	4734 therms/month
Heater Demand Last 7 Days:	11.6 %	835 therms/month
Savings, First 7 vs. Last 7 Days:	82.4 %	3899 therms/month

RECORDED DATA:

Cumulative Days-On-Line:	104.7 days	
Total Burn Cycles Heater(s) #1:	1036 cycles	
Total Burn Cycles Heater(s) #2:	1036 cycles	
Average Burn Cycle Period #1:	145 mins.	28 secs.
Average Burn Cycle Period #2:	145 mins.	28 secs.
Total Power Interruptions:	11 events	
Adjust so Desired = Average:	0 deg. F.	
Present Adjust for Winter:	0 deg. F.	
Average of Temp1 - Temp2:	30 deg. F.	

CONFIGURATION DATA:

Unit Serial Number:	04168
Maximum Supply Temperature:	127 deg. F.
Minimum Supply Temperature:	105 deg. F.
Minimum Return Temperature:	100 deg. F.
Cycle Delay in Temp. Drop:	3 deg. F.
Cycle Delay in Time Period:	30 seconds
Dead-Band for Sensor #1:	1 deg. F.
Dead-Band for Sensor #2:	6 deg. F.
Sequencing:	Alternating
Audio Alarm:	Disabled
Program Keys:	Locked

WATER HEATING SYSTEM:

Mfgr. of Water Heater(s):	Steam Heat Exchanger
Heater(s) #1 Total Input:	500000 BTUs
Heater(s) #1 Total Output:	500000 BTUs
Heater(s) #2 Total Input:	500000 BTUs
Heater(s) #2 Total Output:	500000 BTUs
Total Storage Tank Capacity:	800 gallons

PROTEMP DOMESTIC WATER HEATER CONTROLLER ECONOMIC ANALYSIS

METER READINGS

DATE		# DAYS	#7812 STANDARD DESIGN			#7818 STANDARD W/PROTEMP			#7842 UPGRADED DESIGN			#7850 UPGRADED DESIGN		
CAL.	JUL.		METER	MCF	MCF/DAY	METER	MCF	MCF/DAY	METER	MCF	MCF/DAY	METER	MCF	MCF/DAY
9MAY	129		7947			6468			9694			2942		
22MAY	142	13	8022	75	5.8	6514	46	3.5	9742	48	3.7	2985	43	3.3
29MAY	149	7	8064	42	6.0	6538	24	3.4	9765	23	3.3	3010	25	3.6
5JUN	156	7	8106	42	6.0	6565	27	3.9	9789	24	3.4	3034	24	3.4
11JUN	162	6	8142	36	6.0	6592	27	4.5	9813	24	4.0	3059	25	4.2
26JUN	177	15	8215	73	4.9	6639	47	3.1	9864	51	3.4	3104	45	3.0
3JUL	184	7	8243	28	4.0	6665	26	3.7	9890	26	3.7	3126	22	3.1
10JUL	191	7	8271	28	4.0	6687	22	3.1	9913	23	3.3	3148	22	3.1
17JUL	198	7	8301	30	4.3	6710	23	3.3	9936	23	3.3	3169	21	3.0
24JUL	205	7	8329	28	4.0	6732	22	3.1	9959	23	3.3	3190	21	3.0
6AUG	218	13	8376	47	3.6	6776	44	3.4	10003	44	3.4	3230	40	3.1
14AUG	226	8	8410	34	4.3	6806	30	3.8	10035	32	4.0	3256	26	3.3
22AUG	234	8	8449	39	4.9	6840	34	4.3	10066	31	3.9	3282	26	3.3
30AUG	242	8	8497	48	6.0	6889	49	6.1	10089	23	2.9	3307	25	3.1
5SEP	248	6	8520	23	3.8	6909	20	3.3	10104	15	2.5	3322	15	2.5
11SEP	254	6	8558	38	6.3	6936	27	4.5	10124	20	3.3	3340	18	3.0
3JUL-11SEP		77		343	4.5		297	3.9		260	3.4		236	3.1

NOTE: 3 JUL - 11 SEP USED BECAUSE BOILER EFFICIENCIES ADJUSTED ON 26 JUN 1990

COST/YEAR = MCF/DAY * 365DAYS/YEAR * $3.00/MCF

BLDG-7812 = $4,877.73 (ORIGINAL BUILDING DESIGN WITH GANG TOILETS)

BLDG 7818 = $4,223.57 (ORIGINAL BUILDING DESIGN WITH GANG TOILETS AND PROTEMP DHW CONTROL)

BLDG 7846 = $3,697.40 (UPGRADED DESIGN WITH SEPARATE TOILETS)

BLDG 7850 = $3,356.10 (UPGRADED DESIGN WITH SEPARATE TOILETS)

SAVINGS OBTAINED BY USING PROTEMP CONTROLLER IN ORIGINAL BLDGS

BLDG 7812 - BLDG 7818 = $4,877.73 - $4,223.57 = $654.16/YEAR

SIMPLE PAYBACK FOR INSTALLING PROTEMP IN THIS STYLE BUILDING

$3,274.00 / ($654.16/YEAR) = 5.00 YEARS

DOMESTIC WATER HEATER

BOILER EFFICIENCY ADJUSTMENT

ECONOMIC ANALYSIS

METER READINGS

DATE CAL.	JUL.	# DAYS	#7812 STANDARD DESIGN METER	MCF	MCF/DAY
9MAY	129		7947		
22MAY	142	13	8022	75	5.8
29MAY	149	7	8064	42	6.0
5JUN	156	7	8106	42	6.0
11JUN	162	6	8142	36	6.0
26JUN	177	15	8215	73	4.9
3JUL	184	7	8243	28	4.0
10JUL	191	7	8271	28	4.0
17JUL	198	7	8301	30	4.3
24JUL	205	7	8329	28	4.0
6AUG	218	13	8376	47	3.6
14AUG	226	8	8410	34	4.3
22AUG	234	8	8449	39	4.9
30AUG	242	8	8497	48	6.0
5SEP	248	6	8520	23	3.8
11SEP	254	6	8558	38	6.3
9MAY-26JUN		48		268	5.6
3JUL-11SEP		77		343	4.5

COST/YEAR = MCF/DAY * 365DAYS/YEAR * $3.00/MCF

BEFORE BOILER ADJUSTMENT = $6,113.75

AFTER BOILER ADJUSTMENT = $4,877.73

SAVINGS OBTAINED BY ADJUSTING BOILER EFFICIENCY

BEFORE - AFTER = $1,236.02/YEAR

E...1

EMC ENGINEERS, INC.
2750 South Wadsworth Blvd. • Suite C-200
Denver, Colorado 80227-3400
303/988-2951 • Fax: 303/985-2527

CONFIRMATION NOTICE

Confirmation Notice No. 6 EMC #1406.001

DATE: 5 December 1995

PROJECT: Feasibility Study for Installation of UMCS, Fort Riley, Kansas

CONTRACT NO.: DACA 01-94-D-0033
DEL. ORD. NO.: 0001

NOTES
PREPARED BY: Alan Niemeyer, E M C Engineers, Inc.

SUBJECT: Prefinal Submittal Review Comments

The Prefinal Submittal review comments for the Feasibility Study for Installation of UMCS were received from the following organizations:

- Fort Riley Public Works Energy Branch
- U.S. Army Engineer District, Mobile, AL

A total of twenty-three comments were received. Due to the small number of review comments, the Fort Riley Public Works Energy Branch and Kansas City District Corps of Engineers decided not to hold a formal review meeting.

The responses to the review comments are as follows:

Comments from Larry Stillwagon, Fort Riley Public Works Energy Branch:

1. Comment #1. Annotation: CONCUR. A FO multiplexer will be shown at Bldg. 600.

2. Comment #2. Annotation: CONCUR. Bldg. 330 will be relocated with the 8000 area buildings.

3. Comment #3. Annotation: CONCUR. Additional modems will be shown in Bldgs 600 and 615.

4. Comment #4. Annotation: CONCUR. A test DSC 8500 will be shown in Bldg 364.

5. Comment #5. Annotation: CONCUR. Energy Savings will be included in the list of standard reports.

6. Comment #6. Annotation: CONCUR. This study does include a minimum of 10% spare capacity for new RCUs and ACUs, and is reflected in the cost estimate. This information will be included in paragraph 4.2..

7. Comment #7. Annotation: CONCUR. A control relay with HOA will be added to the Small Steam Boilers.

8. Comment #8. Annotation: CONCUR. The monitoring and alarm points for Bldgs 650 and 652 will be added to the study. The existing control points on the existing EMCS are included in this study for replacement with new control points. The replacement costs for new controls are included in the cost estimates.

9. Comment #9. Annotation: CONCUR. Humidity sensor will be included.

10. Comment #10. Annotation: CONCUR. Humidity sensors for AHUs in Bldgs. 203 and 205 will be included.

11. Comment #11. Annotation: CONCUR. Humidity sensors for AHUs in Bldg 207 will be included.

12. Comment #12. Annotation: CONCUR. High and Low Limits will be included in the I/O summary tables for AHUs instead of Contact Closures.

13. Comment #13. Annotation: CONCUR. An I/O summary table and control costs will be included for pneumatic control air where pneumatic devices remain in service.

14. Comment #14. Annotation: CONCUR.

15. Comment #15. Annotation: CONCUR. The I/O summary table will be corrected.

16. Comment #16. Annotation: CONCUR.

17. Comment #17. Annotation: CONCUR.

18. Comment #18. Annotation: INFO. The existing EMCS equipment will be replaced with the installation of the new UMCS.

19. Comment #19. Annotation: CONCUR.

20. Comment #20. Annotation: CONCUR.

Comments from Robert S. Woodruff, EN-DM, Mobile District, AL.:

21. Comment #1. Annotation: INFO. Historical information on the hours required for maintenance were not available. Typical maintenance hours for HVAC equipment types were assumed.

22. Comment #2. Annotation: INFO. Energy savings are accomplished by direct digital control (DDC) of the domestic hot water (DHW) temperature. For the existing DHW system, the DHW must be kept at a high temperature to meet the heaviest DHW demand. An example of a high DHW temperature is 140 °F. With DDC controls installed on the DHW system, the DHW temperature can be controlled to match the DHW demand. The DHW temperature can be lowered during hours between peaks in DHW demand. An example of a lower DHW temperature is 115 °F. There is a substantial energy savings between the existing constant temperature DHW system and the fluctuating temperature on the DDC controlled DHW system.

23. Comment #3. Annotation: CONCUR.

Alan J. Niemeyer

Alan J. Niemeyer
Project Engineer, E M C Engineers, Inc.

Attachments: Written Government Comments

cc:

David E. Werner	Robert S. Woodruff	Tony Battaglia	Naresh K. Kapur	
Ken Arrington	Larry Stillwagon	Keith R. Jevons	Carl Lundstrom	File

If any portion of this Confirmation Notice is incorrect, please notify us immediately. If correspondence is not received to the contrary within 14 days, it will be assumed that the decisions, conclusions, and status outlined in this Confirmation Notice are correct.

Public Works Fort Riley, Kansas
Engineering Review Comments

To: KCD, D. Werner

Plans & Specifications or Draft: ☐ Concept ☐ Final ☒	Project: UMCS FEASIBILITY STUDY (EEAP)
Designed by: ☒ A/E ☐ KCD ☐ In-house	Suspense Date:
Comments by: L. Stillwagon/ L. Pipes	Office: PW-EE — Date: 31-Oct-95

Reference	Item No.	Comments	Action
Vol 1, Sec 2, p 2-15, Fig 2-1	1	Show a FO multiplexer at Bldg 600. FO is direct connected from Bldg 364 to Bldg 600. It is not routed through dial central.	
Vol 1, Fig 2-1, p 2-15	2	Bldg 330 is located on trunk 3 with the 8000 area Bldgs.	
Vol 1, Fig 2-1, p 2-15	3	There are 2 direct connect modems each in Bldgs 600 and 615.	
Vol 1, Fig 2-1, p 2-15	4	There is a test DSC 8500 in Bldg 364.	
Vol 1, Sec 3, p 3-2, Para 3.3	5	Add the following standard report: Energy Savings	
Vol 1, Sec 4, p 4-2, para 4.2	6	New RCUs and ACUs should have a minimum of 10% spare capacity, but not less than two (2) of each of the following: digital output, digital input, analog output, and analog input.	
Vol 1, App D, I/O #3, p D-8	7	We want a Control Relay W/H-O-A on the Small Steam Boilers	
Vol 1	8	Bldgs 650 and 652 have several monitoring and panic points on the existing EMCS system that appear to have been left off of this study (EX. I/O #8, E4-31). Are all existing points on the existing EMCS listed in the study and included in the cost estimate? This project is to replace what is existing and to install new.	
Vol 1, I/O #10, p D-32	9	Multizone AHU - Bldg 406 has a humidifier. Install a sensor in a central location.	
Vol 1, I/O #13, p D-39	10	Bldg 203/205 need humidity sensors installed for each AHU area served.	
Vol 1, I/O #15, p D-41	11	Bldg 207 needs humidity sensors installed for each AHU area served.	
Vol 1, I/O Tables all AHUs	12	Instead of using the contact closure to show that the AHUs are on, we request that High and Low Limits be installed on the AMP (analog point) to prove status.	
General I/O	13	Install Low Pressure Alarm on pneumatic control air (10# Adj.) where pneumatic devices remain in service after completion of this project.	

Vol 1, I/O Failure Mode	14	All outside Air Dampers should fail to normal (usually closed).	
Vol 1, I/O #16, p D-51	15	This I/O Sheet will not work for MAUs. Fan and OA should fail to last command or the Fan should be off when the OA damper is closed. The heating coil can fail on.	
General	16	Add SIR to all lists of abbreviations.	
DD 1391	17	Delete the reference to Central Plants.	
DD 1391, and Cost estimate	18	Include replacement of existing EMCS equipment in 23 Bldgs (unless this is part of 191 Bldgs). Make sure we know all of the existing points on the EMCS that you don't intend to connect to the new UMCS.	
DD 1391	19	Under "<u>Current Situation</u>:" change the second paragraph to the following: Discussions with the EMCS operators at Fort Riley regarding the existing EMCS indicated the system is currently used to its capacity and is energy inefficient and technologically obsolete (failing).	
DD 1391 & LCCID	20	Use 7% for SIOH and 6% for Design.	

MOBILE DISTRICT PROJECT REVIEW COMMENTS:	DATE: 18 Oct 1995	Page 1 of 1
TO: U. S. Army Corps of Engineers, Kansas City District	FROM: Robert S. Woodruff, CESAM-EN-DM Phone: (334) 694-6074 FAX: (334) 690-2424	

PROJECT/FY: Feasibility Study for Installation of UMCS

LOCATION: Fort Riley, Kansas

TYPE REVIEW: Prefinal Report

NO.	Page/Par	COMMENT	
1.	P. C-19	Is there any justification for the manhour savings indicated ?	
2.	P. C-21	The Protemp system needs more explanation. How are these large energy savings produced by lowering the water temperature in a insulated tank ?	
3.		Excellent Report	

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 1

To ALAN Niemeyer	From DAVID WERNER
Co. EMC	Co. KCD COE
Dept.	Phone # 816 426 2597
Fax # 303 985 2527	Fax # 816 426 3690

APPENDIX B

UMCS APPLICATION PROGRAMS

APPENDIX B

UMCS APPLICATION PROGRAMS

This appendix contains descriptions of the UMCS application programs listed in Section 3.0 of this report.

B.1 ENERGY CONSERVING FUNCTIONS

B.1.1 Scheduled Start/Stop

Scheduled start/stop is the starting and stopping of a system based on the time and type of day. Type of day refers to weekdays, Saturdays, Sundays, holidays, or any other day with specific schedule of operation. This is the simplest of all UMCS functions to install, maintain, and operate. It also provides the greatest potential for energy conservation if systems are currently operated unnecessarily during unoccupied hours. When applied to environmental systems, the function generally includes a temperature sensor in the conditioned space which prompts the UMCS to override the shutoff if the temperature goes below or above a certain level. Using this function in an UMCS for all applicable systems can potentially save fan motor or pump motor energy as well as energy used to heat outside air, by eliminating unnecessary operation of a system. Energy to heat outside air can be saved only in a system which brings in outside air.

B.1.2 Duty Cycling

Duty cycling consists of the shutdown of a system for predetermined short periods of time during normal operating hours. The function is based on the fact that HVAC systems seldom operate at peak output; thus, if a system is switched off for a short period of time, it has sufficient capacity to overcome the slight temperature drift which occurs during this shutdown. Although the interruption does not reduce the net space heating or cooling energy, it does reduce energy input to constant auxiliary loads such as fans and pumps. Cycling will reduce the heating and cooling loads by reducing the quantity of outside air admitted to the space when the supply fan is off. Systems are generally cycled off for a fixed period of time; for example, systems may be off 15 minutes out of each hour of operation. The off period should be adjusted automatically to satisfy space temperature conditions, which will result in a longer off period during moderate seasons and a shorter off period during peak seasons.

Duty cycling does produce additional wear on belts and motor starting circuits, especially when applied to large fans which develop high-torque loads during start-up.

B.1.3 Demand Limiting Start/Stop

Demand limiting software stops electrical loads to prevent setting a high electrical demand peak. The UMCS predicts demand on the basis of monitored data. When these predictions exceed preset limits, pre-selected electrical loads are shut off, thus reducing the rate of consumption and the predicted peak demand. Additional loads are tuned off on a priority basis if the initial load shed action does not reduce the predicted demand sufficiently to satisfy the function requirements. As in duty cycling, a slight temperature drift must be allowed for shutting off the HVAC equipment. The duty cycling and demand limiting functions must be coordinated to prevent conflicting commands.

B.1.4 Direct Digital Control

During periods when HVAC equipment is operating, temperature control in spaces can be improved and controlled to chosen setpoints more closely by allowing the UMCS to provide direct digital control of the system. Some areas are currently overheating and overcooling and have little provision for the temperature control; implementing direct digital control in those areas would involve controlling valves and dampers based on space temperature sensor input.

For the purposes of this analysis, the proposed occupied setpoints (after UMCS installation) are 70°F winter and 76°F summer.

B.1.5 Night Setback

The night setback function saves energy by decreasing heating temperatures and increasing cooling temperatures during hours when buildings are not occupied. This function would be applied in conjunction with the time scheduled start/stop function for cooling systems and forced air heating systems. The UMCS will set upper and lower temperature limits as a basis for determining when the HVAC system must operate.

The night setback function should not be applied to heating and cooling systems serving areas which require 24 hours of space conditioning, such as barracks, laboratory areas, and computer rooms.

The proposed night temperature setpoints used in this analysis are 55°F for heating and 85°F for cooling.

B.1.6 Ventilation/Recirculation Damper Control

A damper control interface allows the UMCS to close the outside air damper when the fan system must be operating but no ventilation is required. Damper control has the potential to save the energy required to heat the outside air to environmental conditions; this function was considered on all systems which bring outside air into

the space. Ventilation levels were assumed to remain unchanged during occupied hours; therefore, savings were considered only during pre-occupancy warm-up.

B.1.7 Economizer

Using an outside air economizer cycle can be cost effective when applied to mechanical cooling systems. Where applicable, the cycle uses outside air to satisfy all or a portion of the cooling requirements of the building or zone when the temperature of the outside air is less than that of the return air from the space. Outside air is introduced through the mechanical system, and return air is exhausted rather than recirculated. When the temperature of the outside air is greater than that of the return air form the space, the UMCS positions the outside air damper to a minimum position.

B.1.8 Optimum Start/Stop

An additional feature of the time scheduled operation is the optimized start/stop feature available with the UMCS. Mechanical systems serving areas which are not occupied 24 hours a day or do not require special environmental conditions should be shut down during the unoccupied hours. Traditionally, the systems are restarted to cool or heat the space prior to occupancy, and then shut down at the end of the work day. Start/stop optimization usually works on a fixed schedule, independent of such factors as weather and space conditions. This software automatically starts and stops the system at times which will minimize the energy required to provide the desired environmental conditions during occupied hours. In addition, this function automatically evaluates the thermal inertia of the structure, the capacity of the system to either increase or reduce temperatures in the facility, start-up and shut-down times, and weather conditions. In this way, the UMCS can accurately determine the minimum hours of operation required of the HVAC system to satisfy the thermal requirements of the building.

B.1.9 Hot Water Outside Air Temperature Reset Schedule

This function was considered for hot water boilers and converters. Hot water boilers and converters were originally installed to maintain satisfactory temperatures in the space during design weather conditions; consequently, the hot water supply temperature is higher than required when the heating requirements for the facility are reduced. For most facilities, this reduction in heating requirements is directly related to an increase in outdoor temperature. Where applicable, reducing the temperature of the supply water in response to outdoor temperature will affect operating savings. To accomplish this function, the temperature controller for the hot water supply is reset on a predetermined schedule in response to outdoor temperature.

B.1.10 Chilled Water Temperature Reset

The energy required to produce chilled water in a reciprocating or centrifugal chiller is a function of the chilled water temperature as it leaves the chiller; the higher the temperature the lower the energy input per ton of refrigeration. This application program resets chilled water temperature upward until the required space temperature and humidity levels can no longer be maintained. This determination is made by monitoring the space temperatures and humidity.

B.2 UMCS MONITORING FUNCTION

B.2.1 Run-time Reports

Several maintenance procedures associated with mechanical equipment are related to the number of operating hours of the specific item of equipment. These maintenance functions include lubrication, bearing checks, and overhaul schedules. With run-time reports, maintenance functions can be performed closer to actual need, rather then on a calendar basis. No additional hardware is required to provide this function, because it is generated in software as a result of monitoring the motor status contact. This monitoring is required for the various start/stop functions.

B.2.2 Energy Metering

This software monitors and accepts readings from various energy meters and then totalizes the energy consumption (including Btu, flow, kW, or kWh) over 15 minute, hourly, daily, monthly, or yearly periods. The resulting values are stored in memory and can be printed in a report format upon the operator's request.

B.2.3 Temperature Monitoring

This function provides the system operator with the space temperature of a given area or the operating temperature of a given piece of equipment and will signal the system operator if these temperatures drift outside their programmed limits. The space temperature in a computer room is an example of this function.

B.2.4 Status Condition Monitoring

This function is provided for all equipment directly controlled by the UMCS. It allows the UMCS operator to ensure that equipment scheduled to be operating at a given time is actually operating and that equipment scheduled to be off at a given time is indeed off. Without this function unauthorized personnel could easily circumvent UMCS control of a given piece of equipment, and the EMC operator would not know.

APPENDIX C

ALGORITHMS AND ENERGY CONSTANTS USED IN ANALYSIS

APPENDIX C

ALGORITHMS AND ENERGY CONSTANTS USED IN ANALYSIS

C.1 GENERAL

The UMCS energy savings were calculated using the guidelines presented in NCEL Manual CR 82.030, Standardized UMCS Energy Savings Calculations. This manual was used as a guide in preparing calculation formulae and in performing computer simulations for energy savings. Energy savings formulae simulations are managed by a computer database program developed by E M C Engineers, Inc.

The computer database program consists of the following:

- System variables which are derived from field survey data. (These are explained in Subsection C.2).
- Energy constants which are developed for use with hand calculation for various UMCS control functions. (These are explained in Subsection C.3).
- Energy savings formulae. (These are described in Subsection C.4).

The field data is entered into the computer database program, and the calculations are made using the indicated formulae.

C.2 SYSTEM VARIABLES

Associated with the energy constants are variables which pertain to the system operation and capacities. These variables are used in formulae along with energy-described constants to estimate the savings from the implementation of certain UMCS functions.

cfm HTG = Cfm of heating capacity for a given air handling system.

cfm CLG = Cfm of cooling capacity for a given air handling system.

EFF = An average annual conversion efficiency for heating systems at Fort Riley. The value used is representative of a typical boiler plant.

EFFHP = The typical motor efficiency for the name plate horsepower rating.

HRSON = The total number of hours a mechanical system would operate per year after UMCS installation (i.e., proposed hours of operation).

HRSAV = The number of hours saved per year which would result from the installation of an UMCS with a fixed time schedule (i.e., the number of

hours/year a system is presently operating minus the proposed number of hours on/year).

kW/ton	=	The input power to mechanical refrigeration per output tonnage of air conditioning (kW/ton).
Motor HP	=	The rated horsepower of a mechanical system.
% Area	=	The percentage of a building which a heating system serves.
% OA	=	Percentage of outside air brought in by a mechanical system.
UA	=	Building insulating "U" factor times area.
Tons	=	The rated cooling capacity output of an air conditioning unit (1 ton = 12,000 Btu).
Load Factor	=	The percent of loading of a motor.
MOSON	=	The total number of months a mechanical system would operate per year.
MBtu	=	The rated heating capacity output of a heating unit (millions of Btus).

C.3 ENERGY CONSTANTS

Twenty-one categories of energy constants were developed for use in energy equations applicable to certain UMCS functions at Fort Riley. These constants are defined below.

The first four categories considered are used in equations which calculate the energy required to condition outside air. These equations apply to all buildings with systems using outside air.

1. HOAU = Average energy (Btu) required to heat one cfm of outside air (OA) to 55°F for one hour during the typical hours the building is unoccupied. This is the proposed unoccupied temperature setpoint for the heating season.

   HOAUH = Heating-only systems related to HOAU.

   HOAUHC = Heating and cooling systems related to HOAU.

2. COAU = Average energy (kWh) required to cool one cfm of OA to 85°F for one hour during the typical hours the building is unoccupied. This is the proposed unoccupied temperature setpoint for the cooling season.

   COAUC = Cooling-only systems related to COAU.

	COAUHC	=	Cooling and heating systems related to COAU.
3.	HOAO	=	Average energy (Btu) required to heat one cfm of outside air to 70°F during the typical hours the building is occupied. This is the proposed occupied temperature for the heating systems.
	HOAOH	=	Heating-only system related to HOAO.
	HOAOHC	=	Heating and cooling system related to HOAO.
4.	COAO	=	Average energy (kWh) required to cool one cfm of OA to 76°F for one hour during the typical hours the building is occupied. This is the proposed occupied temperature for the cooling systems.
	COAOC	=	Cooling-only system related to COAO.
	COAOHC	=	Heating and cooling system related to COAO.
5.	DC	=	Estimated average percent of motor operating time which can be saved through duty cycling.
6.	ECM	=	Average cooling energy (kWh) saved per hour per cfm, for an economizer system operating during occupied hours.
	ECC	=	The value of ECM for cooling-only systems.
	ECHC	=	The value of ECM for combined heating and cooling systems.
7.	NSUC	=	Average electric energy (kWh) saved per cfm per hour for cooling air by shutting the system down during the hours the building is unoccupied.
	NSUCC	=	Cooling-only system related to NSUC.
	NSUCHC	=	Heating-cooling system related to NSUC.
8.	DDC	=	Average electrical energy (kWh) saved per cfm per hour for cooling, by providing direct digital control during the hours the building is occupied.
	DDCCC	=	Cooling-only system related to DDC.
	DDCHC	=	Heating-cooling system related to DDC.
9.	NSC	=	Heating energy savings (MBtu) per UA resulting from night setback.
	DDCH	=	Heating energy savings (MBtu) per UA resulting from direct digital control.

10. OPT = The number of hours saved per year through optimal start/stop program calculated from NCEL CR 82.030.

11. CHWR = Chilled water reset factor calculated from NCEL CR 82.030.

12. OAR = Outside air reset factor for hot water boilers calculated from NCEL 82.030.

C.4 ENERGY SAVINGS FORMULAE FOR UMCS FUNCTIONS

The following equations are used in the computer database program to calculate savings resulting from using an UMCS. The system variables and energy constants used in the equations are explained in Subsections C.2 and C.3 of this Appendix.

Time Schedule Start/Stop

a. Motor electrical energy savings:

kWh/yr = (motor hp) x (0.746 kW/hp) x (80% Load Factor) x (HRSAV)/(EFFHP)

b. Outside air heating savings:

MBtu/yr = (cfm HTG) x (% OA) x (HRSAV) x (HOAU) x $1/10^6$

c. Outside air cooling savings:

kWh/yr = (cfm CLG) x (% OA) x (HRSAV) x (COAU)

Duty Cycle

a. Motor electrical energy savings:

kWh/yr = (Motor hp) x (DC) x (HRSON) x (0.746 kW/hp) (80% load factor)/(EFFHP)

b. Outside air heating savings:

MBtu/yr = (HOAO) x (DC) x (cfm HTG) x (% OA) x (HRSON) x $1/10^6$

c. Outside air cooling savings:

kWh/yr = (COAO) x (DC) x (cfm CLG) x (%OA) x (HRSON)

Optimized Start/Stop

Motor electrical energy savings:

kWh/yr = (Motor hp) x (0.746 kW/hp) x (80% Load Factor) x (OPT)/(EFFHP)

Demand Start/Stop

$$kW/yr = (Motor\ hp) \times (0.746\ kW/hp) \times (80\%\ Load\ Factor) \times (MOSON) \times (DC) / (EFFHP)$$

Demand Chiller

$$kW/yr = (Tons\ capacity) \times (kW/ton) \times (MOSON) \times (DC)$$

Savings by Ventilation and Recirculation

a. Heating savings:

$$MBtu/yr = (cfm\ HTG) \times (\%\ OA) \times (HOAU) \times (OPT) \times 1/10^6$$

b. Cooling savings:

$$kWh/yr = (cfm\ CLG) \times (\%\ OA) \times (COAU) \times (OPT)$$

Economizer

Cooling savings:

$$kWh/yr = (cfm\ CLG) \times (ECHC) \times (HRSON)$$

Outside Air Reset

$$MBtu/yr = (MBtu) \times (OAR)/EFF$$

Chilled Water Reset

$$Kwh/yr = (Tons\ capacity) \times (CHWR)$$

Direct Digital Control

a. Building heating savings:

$$MBtu\ DDCB = DDCH \times UA$$

b. System heating savings:

$$MBtu/yr = (\%\ Area) \times (MBtu\ DDCB)$$

c. System cooling savings:

$$Kwh/yr = (DDCC) \times (cfm\ CLG) \times (HRSON)$$

Night Setback

a. Building heating savings:

MBtu NSB = NSC x UA

b. System heating savings:

MBtu/yr = (% area) x (MBtu NSB)

c. System cooling savings:

kWh/yr = (NSUC) x (cfm CLG) x (HRSAV)

C.5 DERIVATIONS OF ENERGY CONSTANTS

Computer simulations were performed to calculate many of the energy constants which are used in the computer database program. Simulations were performed on twenty-one different building category types, to arrive at energy constants which specifically relate to the type of building construction and its use. The twenty-one building categories simulated are included in Table C-1 on the following page.

TABLE C-1. BUILDING CATEGORIES

CATE-GORY	TYP. BLDG	CONSTRUCTION	USE	OCCUPANCY HOURS	OCCUPANCY DAYS
1	5000	Panel & Metal Beam	Fire Station	0000-2400	M-F; SAT-SUN
2	7450	Brick and CMU	Administration	0600-1700	M-F
3	8021	Brick and CMU	Admin & Supply	0700-1600	M-F
4	406	Sandstone Block	Administration	0700-1700	M-F
5	7618	Brick and CMU	Barracks	0000-2400	M-F; SAT-SUN
6	409	Sandstone Block	Barracks	0000-2400	M-F; SAT-SUN
7	7108	Brick and CMU	Battalion	0700-1800	M-F; SAT
8	7086	Brick and CMU	Church	0700-1800	SAT-SUN
9	6	Sandstone Block	Church	0700-1800	M-F; SAT-SUN
10	7665	Brick and CMU	Dental Clinic	0800-1700	M-F
11	7245	Brick and CMU	Mess Hall - Dining Area	0600-2000	M-F; SAT-SUN
12	7245	Brick and CMU	Mess Hall - Kitchen Area	0500-2400	M-F; SAT-SUN
13	8300	Metal Panel & CMU	Veh Maint Shop	0700-1800	M-F
14	8300	Metal Panel & CMU	Veh Maint Shop	0700-1800	M-F
15	8069	Brick and CMU	Swimming Pool	0600-2200	M-F; SAT-SUN
16	8069	Brick and CMU	Gymnasium	0600-2200	M-F; SAT-SUN
17	6914	Brick and CMU	Retail Shop	0800-2200	M-F; SAT-SUN
18	724	Metal Panel & CMU	Simulator Bldg	0600-1600	M-F
19	7485	Brick and CMU	Bowling Alley	0800-2400	M-F; SAT-SUN
20	7866	Brick and CMU	Theater	1700-2400	TH-F; SAT-SUN
21	7656	Brick and CMU	Training	0700-2100	M-F

A summary of the energy constants determined by computer simulation are shown below in Table C-2.

TABLE C-2. ENERGY CONSTANTS

Constant	Category 1	Category 2	Category 3	Category 4	Category 5	Category 6	Category 7
HOAUHC	0	0	0	27.8	0	0	16.2
HOAUH	0	0	0	44.6	0	0	26.1
COAUHC	0	0	0	0	0	0	.000257
COAUC	0	0	0	0	0	0	.00068
HOAOHC	0	0	0	40.4	0	8.06	33.3
HOAOH	0	0	0	65.0	0	13.0	53.5
COAOHC	0	0	0	.000877	0	.000274	.00115
COAOC	0	0	0	.00232	0	.000725	.00305
DC DUTY	.17	.17	.17	.17	.17	.17	.17
DC	.17	.17	.17	.17	.17	.17	.17
ECC	0	0	0	.0000629	0	.000267	.00021
ECHC	0	0	0	.0000238	0	.000101	.0000795
NSUCHC	0	.000176	.000226	.000609	0	0	.000941
NSUCC	0	.000467	.000598	.00161	0	0	.00249
DDCCHC	.000137	.000111	.0000188	.000411	.0000556	.0000895	.000233
DDCCC	.000362	.000294	.0000498	.00109	.000147	.000237	.000616
NSC	36400	10900	93100	131000	20000	18900	36600
DDCH	84900	32500	29900	43100	33900	37600	30100
OPT	0	305	305	305	0	0	305
CHWR	17.5	17.5	17.5	17.5	17.5	17.5	17.5
OAR	5.67	5.67	5.67	5.67	5.67	5.67	5.67

TABLE C-2. ENERGY CONSTANTS (Continued)

Constant	Category 8	Category 9	Category 10	Category 11	Category 12	Category 13	Category 14
HOAUHC	16.8	16.4	50.2	28.4	0	0	0
HOAUH	27.0	26.4	80.7	45.6	0	0	0
COAUHC	.000346	.000295	.00121	.000623	0	0	0
COAUC	.000915	.000779	.0032	.00165	0	0	0
HOAOHC	71.1	44.1	45.3	33.9	0	0	0
HOAOH	114.0	70.9	72.8	54.4	0	0	0
COAOHC	.00247	.00145	.0017	.000648	0	0	0
COAOC	.00652	.00384	.0045	.00171	0	0	0
DC DUTY	.17	.17	.17	.17	.17	.17	.17
DC	.17	.17	.17	.17	.17	.17	.17
ECC	.00032	.000312	.000826	.000208	0	0	0
ECHC	.000121	.000118	.000312	.0000788	0	0	0
NSUCHC	.000202	.000139	.000143	.000261	0	.000105	0
NSUCC	.000533	.000369	.000379	.000691	0	.000278	0
DDCCHC	.000586	.000229	.000119	.00018	.00000209	.000161	.0000199
DDCCC	.00155	.000607	.000319	.000476	.00000552	.000426	.0000526
NSC	102000	53200	36000	57200	992000	94300	1100000
DDCH	55700	46300	40300	22500	9640	40600	64800
OPT	305	305	305	305	305	305	305
CHWR	17.5	17.5	17.5	17.5	17.5	17.5	17.5
OAR	5.67	5.67	5.67	5.67	5.67	5.67	5.67

TABLE C-2. ENERGY CONSTANTS (Concluded)

Constant	Category 15	Category 16	Category 17	Category 18	Category 19	Category 20	Category 21
HOAUHC	0	20.9	17.4	15.4	22.3	26.6	21.1
HOAUH	0	33.6	28.0	24.8	35.8	42.7	34.0
COAUHC	0	.000213	.000233	.000295	.000251	.000589	0
COAUC	0	.000562	.000615	.000779	.000665	.00156	0
HOAOHC	0	27.8	36.7	15.5	25.5	29.2	17.3
HOAOH	0	44.7	59.1	25.0	41.0	46.9	27.9
COAOHC	0	.000391	.00124	.000155	.000793	.00251	.000885
COAOC	0	.00103	.00328	.00041	.0021	.00664	.00234
DC DUTY	.17	.17	.17	.17	.17	.17	.17
DC	.17	.17	.17	.17	.17	.17	.17
ECC	0	.000022	.000795	.000743	.000076	.000496	.000207
ECHC	0	.0000083	.0003	.000281	.0000287	.000188	.0000784
NSUCHC	.000351	.000637	.000455	.000318	.000999	.000476	.000221
NSUCC	.000929	.00168	.0012	.000842	.00264	.00126	.000584
DDCCHC	.00000839	.0000143	.000248	.000122	.000147	.000699	.0000919
DDCCC	.0000222	.0000378	.000657	.000321	.000389	.00185	.000243
NSC	87100	425000	397000	89900	58000	202000	30500
DDCH	34300	11000	207000	40800	60400	116000	31900
OPT	305	305	305	348	305	305	348
CHWR	17.5	17.5	17.5	17.5	17.5	17.5	17.5
OAR	5.67	5.67	5.67	5.67	5.67	5.67	5.67

The energy constants presented in Table C-2 were calculated by using computer simulation methods similar to those outlined in NCEL Manual CR 82.030 "Standardized UMCS Energy Savings Calculations." In general, this consists of simulating system and building operations as they exist, and then performing additional simulations which reflect the implementation of various UMCS control functions. Comparison of the simulation runs indicates the quantity of energy reductions, if any. Care was taken to avoid duplicating energy savings by considering the interrelationships between the various UMCS functions which were being simulated. The EZDOE computer program was used to perform the computer simulations.

The NCEL manual allows the energy savings determined from a building computer simulation to be proportioned to similar systems and buildings. The method used in this study to proportion energy savings to non-simulated buildings placed additional emphasis on the specific parameters of each mechanical system. Energy constants derived from the building computer simulations are expressed in terms which relate to mechanical system size and operation. This approach was made possible through the use of the computer database program, which provides an accurate calculation of the energy savings for each system type.

Computer simulations were also used to determine the direct digital control and night setback savings available for each of the building types. Temperature setback savings for non-simulated buildings were then determined by applying the ratio of the total UA values of the non-simulated building to the total UA value of the simulated buildings with similar construction and operating schedules; the savings were then adjusted by this ratio.

Constants which were not determined by computer simulation were calculated by the manual methods outlined in NCEL Manual CR 82.030 as follows:

- **<u>Duty Cycling (DC)</u>**. The duty cycling constant equals 10/60, or 0.17, based on the assumption in the NCEL Manual that a system may be shut down an average of 10 minutes per hour.

- **<u>Optimal Start/Stop (OPT)</u>**. The number of hours saved per year through optimal start/stop (OPT):

$$OPT = (WH \times AND) - ERT$$

where

WH = Present warm-up time prior to occupancy = 2 hrs

AND = Annual number of days total that warm-up is required in days per year

ERT = Equipment run time total required for warm-up in hours per year.

- **<u>Annual Number of Days warm up (AND)</u>**. Table C-3, below, illustrates the determination of AND (weather data for Fort Riley) using the Manual criteria.

TABLE C-3. ANNUAL NUMBER OF DAYS WARM-UP

TEMPERATURE RANGE (°F)	OCCURRENCE BETWEEN 01:00 AND 08:00	NUMBER OF DAYS ANNUALLY (HOURS OF OCCURRENCE /8)
55/59	230	29
50/54	197	25
45/49	181	23
40/44	188	24
35/39	226	28
30/34	248	31
25/29	214	27
20/24	150	19
15/19	103	13
10/14	67	8
5/9	50	6
0/4	23	3
-5/-1	14	2
-10/-6	4	1
-11 & Below	1	1
	TOTAL WARM-UP DAYS	240

- Warm-up is required 240 days annually.
- Equipment run time (ERT) is taken from NCEL Document CR 82.030, page 34
  - ◊ Annual degree days 5306 @ Fort Riley
  - ◊ From Figure 10, NCEL Manual with U=0.09 for heavy construction and U=0.06 for light construction.
  - ◊ ERT = 175 hours/yr for heavy building construction and ERT = 132 hours/yr for light building construction
- OPTIMUM Start/Stop:

Therefore, OPT for heavy construction is: OPT = (2 x 240) - 175 = 305 hrs/yr

OPT for light construction is: OPT = (2 x 240) - 132 = 348 hrs/yr

- Chilled water reset factor (CHWR).

Table C-4, below, illustrates the determination of CFLH (weather data for Fort Riley) using the Manual criteria.

TABLE C-4. FULL-LOAD HOURS COOLING

MEAN (°F) IN RANGE	09 TO 16 HOURS OF OCCURRENCE	DEGREE HOURS M = C x (H - 65°F)
112	0	0
107	3	126
102	15	555
97	51	1632
92	127	3429
87	203	4466
82	265	4505
77	262	3144
72	236	1652
67	209	418
	TOTAL DEGREE HOURS	19927

CHWR = CPT x REI x CFLH x degrees of reset

Where:

Cooling design temperature = 95°F (Engineer Weather Data page 1-16)

CPT = 1.1 kW per ton for typical air cooled reciprocating chiller

CFLH = equivalent full-load hours for cooling (19,927 / (95 - 65°F) = 664 hrs/yr)

REI = rate of efficiency increase per °F increase of chilled water temperature (0.012 for reciprocating chiller from NCEL manual (page 59)),

Degrees
of Reset = 2°F (from NCEL manual)

Therefore,

CHWR = 1.1 x 664 x 2 x 0.012 = 17.53 kW-hr/tons.

- Hot Water outside air reset factor (OAR)

$$OAR = HFLH \times EI ,$$

Where:

HFLH = annual equivalent full load hours for heating in hr/yr

EI = efficiency increase (0.01 from NCEL manual CR 82.030, page 57).

Table C-5, below, illustrates the determination of HFLH (Weather data from Fort Riley) per NCEL manual.

TABLE C-5. FULL-LOAD HOURS HEATING

MEAN (°F) IN RANGE	09 TO 16 HOURS OF OCCURRENCE	DEGREE HOURS N = C x (65°F - H)
62	195	585
57	190	1520
52	185	2405
47	177	3186
42	169	3887
37	175	4900
32	151	4983
27	113	4294
22	76	3268
17	52	2496
12	33	1749
7	20	1160
2	8	504
-3	3	204
-8	0	0
	TOTAL DEGREE HOURS	35,141 °F-hr.

HFLH = 35,141 °F-hr/yr / [65 - 3°F (design heating temp)] = 567 hr/yr .

Therefore,

OAR = 567 hr/yr x 0.01 = 5.67 hr/yr

C.6 DERIVATION OF SYSTEM VARIABLES

The hours of system operation (HRSON) depend on the building occupancy and on the length of the heating and cooling seasons. Systems are switched over from heating to cooling May 15th and back to heating October 1st by facility maintenance personnel. Therefore, the heating season used for the purpose of analysis was from October 1st through May 15th (32 weeks), and the cooling season was from May 15th through October 1st (20 weeks).

Sample calculations for determining HRS ON/YR from different occupancy schedules are presented below. An additional two hours for morning warming or cooling of the building prior to occupancy were added to the occupancy schedule to account for morning warm-up.

- Buildings occupied 0500-1800 (13 hrs/day, 7 days per week).

Cooling Only System:

$$\frac{\text{Clg Hrs On}}{Yr} = \frac{20wks}{yr} x \frac{5days}{wk} x \frac{13hrs}{day} = \frac{1300hrs}{yr}.$$

Heating Only System:

$$\frac{\text{Htg Hrs On}}{\text{Yr}} = \frac{32wks}{yr} x \frac{5days}{wk} x \frac{13hrs}{day} = \frac{2080hrs}{yr}.$$

Cooling and Heating System:

$$\frac{\text{Clg / Htg Hrs On}}{\text{Yr}} = \frac{52.14wks}{yr} x \frac{5days}{wk} x \frac{13hrs}{day} = \frac{3389hrs}{yr}.$$

- Buildings occupied 24 hours per day, 7 days per week.

Cooling Only System:

$$\frac{\text{Clg Hrs On}}{Yr} = \frac{20wks}{yr} x \frac{7days}{wk} x \frac{24hrs}{day} = \frac{3360hrs}{yr}.$$

Heating Only System:

$$\frac{\text{Htg Hrs On}}{\text{Yr}} = \frac{32wks}{yr} x \frac{7days}{wk} x \frac{24hrs}{day} = \frac{5376hrs}{yr}.$$

Cooling and Heating System:

$$\frac{\text{Clg / Htg Hrs On}}{\text{Yr}} = \frac{52.14 wks}{yr} x \frac{7 days}{wk} x \frac{24 hrs}{day} = \frac{8760 hrs}{yr}.$$

The hours of system operation which can be saved (HRSAV) as a result of installing the UMCS are dependent on the building occupancy and the present method of system operation. Presently, systems are not switched off, except that heating-only and cooling-only systems are shut down at spring and fall switchover or if existing controls utilize time clocks.

Calculations for determining HRS SAVED/YR for the above schedules are as follows:

- Present hours of operation for systems providing both heating and cooling = 8760 hrs/yr.
- Present hours of operation for systems which provide cooling only = 3360 hrs/yr.
- Present hours of operation for system which provide heating only = 5376 hrs/yr.
- Buildings occupied 0500-1800 (13 hrs/day, 7 days per week).

Cooling Only System:

$$\frac{\text{Clg Hrs Saved}}{Yr} = \frac{3360 C\lg HrsOn}{yr} - \frac{1300 C\lg HrsOn}{yr} = \frac{2060 hrs}{yr}.$$

Heating Only System:

$$\frac{\text{Htg Hrs Saved}}{\text{Yr}} = \frac{5376 HtgHrsOn}{yr} - \frac{2080 HtgHrsOn}{yr} = \frac{3296 hrs}{yr}.$$

Cooling and Heating System:

$$\frac{\text{Clg / Htg Hrs Saved}}{\text{Yr}} = \frac{8760 C\lg/ HtgHrsOn}{yr} - \frac{3389 C\lg/ HtgHrsOn}{yr} = \frac{5371 hrs}{yr}.$$

- Buildings occupied 24 hours per day, 7 days per week have no HRS SAVED/YR.

Other system variables used in the analysis included:

kW/Ton = 1.1 for chillers

C.7 MANPOWER SAVINGS

The estimated manpower hour savings for each type of system is based on the size, type, and operation of the system. These manhour savings are for the entire year and are based on typical maintenance activities. The estimated manpower hours savings for each type of system used in the analysis are presented in Table C-6.

TABLE C-6. MAINTENANCE MANPOWER SAVINGS

SYSTEM NO.	SYSTEM TYPE	MANHOURS
1	SMALL HOT WATER BOILER	4
2	LARGE HOT WATER BOILER	26
3	SMALL STEAM BOILER	4
4	LARGE STEAM BOILER	26
5	STEAM TO HOT WATER CONVERTER	3
6	SMALL AIR COOLED CHILLER	4
7	LARGE AIR COOLED CHILLER	6
8	AIR COOLED DX COMPRESSOR	3
9	WATER COOLED CHILLER	11
10	MULTIZONE AHU	5
11	VARIABLE AIR VOLUME AHU	5
12	VARIABLE AIR VOLUME AHU W/ RETURN	5
13	LARGE SINGLE ZONE AHU	5
14	LARGE SINGLE ZONE AHU W/ RETURN	5
15	SMALL SINGLE ZONE AHU	3
16	HEATING AND VENTILATING UNIT	3
17	HEATING AND VENTILATING UNIT W/ RETURN	4
18	DUAL DUCT AHU	5
19	FAN COIL UNIT	0
20	INFRARED RADIANT HEATERS	0
21	HOT WATER UNIT HEATERS	0
22	HEAT PUMP UNIT	0
23	VENTILATION FAN	3
24	DUAL TEMPERATURE WATER PUMP	3
25	HOT WATER RADIATION PUMP	3
26	PUMP	3
27	PERIMETER RADIATION VALVE	3
28	SUMMER / WINTER CHANGEOVER VALVE	3
29	WATER LEVEL ALARM	0
30	COLD STORAGE - BLDG 650	34
31	COLD STORAGE - BLDG 652	18
32	PNEUMATIC CONTROL AIR	0
33	MULTIZONE AHU W/HUMIDIFICATION	5

C.7 EZDOE PROGRAM DESCRIPTION

EZDOE - Commercial Building Energy Analysis (DOE): The EZDOE program is an easy to use IBM PC compatible version of the U.S. Department of Energy (DOE) program known as DOE-2.1. EZDOE calculates the hourly energy use of a building and its life cycle cost of operation given information on the building's location, construction, operation, and heating and air conditioning system. Using hourly weather data and algorithms developed by Lawrence Berkeley Laboratory, EZDOE is a dynamic program that takes into account complex thermal storage effects of various building materials. In addition, EZDOE can also accurately simulate the operation of all types of heating and cooling plants including ice water thermal storage and cogeneration systems. Up to 22 different air handling systems each with multiple control options are supported. The types of heating and cooling plants allowed is nearly infinite as thousands of combinations of chillers, boilers, furnaces, pumps, and cooling tower are allowed. There is even provision for user defined plants and performance curves.

C.8 DDC CONTROLS FOR DHW STORAGE TANK

The energy savings from DDC control of DHW storage tanks was calculated using data provided by the Fort Riley PW Energy Branch. The data provided is an economic analysis for the PROTEMP domestic water heater controller, and is presented on page C-23.

The PROTEMP economic analysis provided the following data:

- Building No. 7812 is listed as the STANDARD DESIGN and represents the baseline existing condition. Over a 77 day period, the energy consumption of natural gas is 343 MCF or 4.454 MCF/day.

- Building No. 7818 has the PROTEMP domestic water heater controller installed and represents the ECO condition. Over a 77 day period, the energy consumption of natural gas is 297 MCF or 3.857 MCF/day.

Building No. 7812 is a rolling-pin style barracks, as is Building No. 7818. There are two large DHW storage tanks located in the basement mechanical room in each of these buildings. Each DHW storage tank has a built-in steam-to-hot water heat exchanger that heats the domestic hot water via steam from a steam boiler. The energy consumption presented above for Building Nos. 7812 and 7818 is in each case, representative of two large DHW storage tanks in each building.

Energy savings can accrue by reducing the DHW water temperature within the storage tanks. This is accomplished by placing water temperature sensors on the DHW supply, DHW return, and the mixed DHW water inside the tank, and by placing valve positioning controls on the steam-to-hot water heat exchanger control valve. The control valve is modulated to maintain an ideal water temperature for a specific time period using a DDC application program.

The energy savings from implementing DDC control of the DHW water temperature are presented below:

Natural gas savings:

4.454 MCF/day - 3.857 MCF/day = 0.597 MCF/day.

Annual natural gas savings:

0.597 MCF/day x 365 days/yr = 218 MCF/yr.

Conversion:

218 MCF/YR x 1,000 CF/MCF x 1,000 Btu/CF = 218,000,000 Btu or 218 MBtu.

Energy savings:

218 MBtu/yr / 2 DHW storage tanks = 109 MBtu/yr per DHW storage tank.

Energy cost savings:

$4.12/MBtu x 109 MBtu/yr = $449/yr.

The energy savings were applied to other DHW storage tanks in buildings that have similar uses. A list of these buildings are included in Table C-7 on page C-24, along with an economic analysis for each building. The field hardware cost for the DDC controls is presented in Appendix E, Subsection E4 under System No. 28.

PROTEMP DOMESTIC WATER HEATER CONTROLLER ECONOMIC ANALYSIS

METER READINGS

DATE CAL.	JUL.	# DAYS	#7812 STANDARD DESIGN METER	MCF	MCF/DAY	#7818 STANDARD W/PROTEMP METER	MCF	MCF/DAY	#7842 UPGRADED DESIGN METER	MCF	MCF/DAY	#7850 UPGRADED DESIGN METER	MCF	MCF/DAY
9MAY	129		7947			6468			9694			2942		
22MAY	142	13	8022	75	5.8	6514	46	3.5	9742	48	3.7	2985	43	3.3
29MAY	149	7	8064	42	6.0	6538	24	3.4	9765	23	3.3	3010	25	3.6
5JUN	156	7	8106	42	6.0	6565	27	3.9	9789	24	3.4	3034	24	3.4
11JUN	162	6	8142	36	6.0	6592	27	4.5	9813	24	4.0	3059	25	4.2
26JUN	177	15	8215	73	4.9	6639	47	3.1	9864	51	3.4	3104	45	3.0
3JUL	184	7	8243	28	4.0	6665	26	3.7	9890	26	3.7	3126	22	3.1
10JUL	191	7	8271	28	4.0	6687	22	3.1	9913	23	3.3	3148	22	3.1
17JUL	198	7	8301	30	4.3	6710	23	3.3	9936	23	3.3	3169	21	3.0
24JUL	205	7	8329	28	4.0	6732	22	3.1	9959	23	3.3	3190	21	3.0
6AUG	218	13	8376	47	3.6	6776	44	3.4	10003	44	3.4	3230	40	3.1
14AUG	226	8	8410	34	4.3	6806	30	3.8	10035	32	4.0	3256	26	3.3
22AUG	234	8	8449	39	4.9	6840	34	4.3	10066	31	3.9	3282	26	3.3
30AUG	242	8	8497	48	6.0	6889	49	6.1	10089	23	2.9	3307	25	3.1
5SEP	248	6	8520	23	3.8	6909	20	3.3	10104	15	2.5	3322	15	2.5
11SEP	254	6	8558	38	6.3	6936	27	4.5	10124	20	3.3	3340	18	3.0
3JUL-11SEP		77		343	4.5		297	3.9		260	3.4		236	3.1

NOTE: 3 JUL - 11 SEP USED BECAUSE BOILER EFFICIENCIES ADJUSTED ON 26 JUN 1990

COST/YEAR = MCF/DAY * 365DAYS/YEAR * $3.00/MCF

BLDG-7812 = $4,877.73 (ORIGINAL BUILDING DESIGN WITH GANG TOILETS)

BLDG 7818 = $4,223.57 (ORIGINAL BUILDING DESIGN WITH GANG TOILETS AND PROTEMP DHW CONTROL)

BLDG 7846 = $3,697.40 (UPGRADED DESIGN WITH SEPARATE TOILETS)

BLDG 7850 = $3,356.10 (UPGRADED DESIGN WITH SEPARATE TOILETS)

SAVINGS OBTAINED BY USING PROTEMP CONTROLLER IN ORIGINAL BLDGS

BLDG 7812 - BLDG 7818 = $4,877.73 - $4,223.57 = $654.16/YEAR

SIMPLE PAYBACK FOR INSTALLING PROTEMP IN THIS STYLE BUILDING

$3,274.00 / ($654.16/YEAR) = 5.00 YEARS

TABLE C-7. ECONOMIC ANALYSIS FOR DDC CONTROLS ON DHW STORAGE TANKS

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG	ENERGY SAVINGS (MBtu)	ENERGY COST SAVINGS ($)	CONSTR. COST ($)	DISC. SAVINGS ($)	SIR	SIMPLE PAYBACK (YRS)
214	ENL BARRACKS W/AS	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
223	ENL BARRACKS W/DAS	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
227	ENL BARRACKS W/AS	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
402	ENL BARRACKS W/AS	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
404	ENL BARRACKS W/DAS	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
409	ENL BARRACKS W/AS	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
410	ENL BARRACKS W/AS	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
411	ENL BARRACKS W/AS	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
610	ENL BARRACKS W/AS	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
5309	GUEST HOUSE	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
7024	GYMNASIUM	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
7050	ENL BARRACKS W/AS	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
7053	ENL BARRACKS W/AS	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
7404	ENL BARRACKS W/O DIN	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7424	ENL BARRACKS W/O DIN	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7610	ENL BARRACKS W/AS	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7612	ENL BARRACKS W/AS	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7614	ENL BARRACKS W/AS	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7616	ENL BARRACKS W/AS	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7618	ENL BARRACKS W/O DIN	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7632	GYMNASIUM	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
7642	ENL BARRACKS W/O DIN	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7644	ENL BARRACKS W/O DIN	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7646	ENL BARRACKS W/O DIN	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7648	ENL BARRACKS W/O DIN	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7650	ENL BARRACKS W/O DIN	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7810	ENL BARRACKS W/O DIN	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7812	ENL BARRACKS W/O DIN	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7814	ENL BARRACKS W/O DIN	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7816	ENL BARRACKS W/O DIN	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7818	ENL BARRACKS W/O DIN	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7842	ENL BARRACKS W/AS	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7844	ENL BARRACKS W/O DIN	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7846	ENL BARRACKS W/AS	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7848	ENL BARRACKS W/O DIN	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8
7850	ENL BARRACKS W/AS	DHW-1	109	$449	$1,269	$4,280	3.4	2.8
		DHW-2	109	$449	$1,269	$4,280	3.4	2.8

APPENDIX D

I/O SUMMARY TABLES

Date Prepared:
12-Sep-95

I/O SUMMARY TABLE

BUILDING NUMBER: TYPICAL

SYSTEM NO.: 1 - SMALL HOT WATER BOILER

GRAPHIC DISPLAY ●

HARDWARE — OUTPUT (DIGITAL, ANALOG) and INPUT (DIGITAL)

	CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACTOR	SOLENOID		POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA	ADJUST SPEED	PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH
BOILER	●																●			
HW SUPPLY																				
HW RETURN																				
HW PUMP			●										●							
OUTSIDE AIR (COMMON)																				
TOTAL	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0

HARDWARE — INPUT (ANALOG)

	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	REMOTE SETPNT OVERRIDE	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE
BOILER															
HW SUPPLY					●										
HW RETURN					●										
HW PUMP															
OUTSIDE AIR (COMMON)															●
TOTAL	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1

HARDWARE — ALARM (DIG, ANA); SOFTWARE — APPLICATION PROGRAMS, DDC PROGRAMS; FAILURE MODE

	CONTACT CLOSURE		HIGH LIMIT	LOW LIMIT	RUN TIME	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	UNOCCUPIED OVERRIDE	PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
BOILER	●				●	●	●			●					●									O
HW SUPPLY			●	●											●									
HW RETURN			●	●											●									
HW PUMP	●				●	●	●			●														O
OUTSIDE AIR (COMMON)										●					●									

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 1 Small hot water boiler

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0006	POST CHAPEL	
		BLR-1
0027	OFF QTRS MILIT	
		BLR-1
		BLR-2
0207	CAVALRY MUSEUM	
		BLR-1
0210	MILIT PERS BLDG	
		BLR-1
0222	ADMIN GEN PURP	
		BLR-1
0253	DRUG ABUSE CTR	
		BLR-1
0302	FINANCE ADMIN	
		BLR-1
0319	GEN INSTR BLDG	
		BLR-1
0405	ADMIN GEN PURP	
		BLR-1
0540	OFF QTRS MILIT	
		BLR-1
		BLR-2
0541	OFF QTRS MILIT	
		BLR-1
		BLR-2
0542	OFF QTRS MILIT	
		BLR-1
		BLR-2
0710	TAC EQUIP SHOP	
		BLR-1
0722	FLIGHT SIMULATOR	
		BLR-1
0724	FLIGHT SIMULATOR	
		BLR-1
0727	MNT HANGAR COMB	
		BLR-2
0806	COMB AC-HTG PLANT	
		BLR-1
		BLR-2
0814	MEDICAL FAC - NEW	
		BLR-1
0817	MNT HANGAR AVUM	

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 1 Small hot water boiler

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		BLR-1
0820	TAC EQUIP SHOP	
		BLR-1
0833	AIRCRAFT HANGAR	
		BLR-1
0840	VEHICLE MNT SHOP ORG	
		BLR-1
0853	MNT HANGAR AVUM	
		BLR-1
1470	AR VEH MNT SHOP	
		BLR-1
		BLR-2
4010	DENTAL CLINIC	
		BLR-1
5000	FIRE STATION	
		BLR-1
5302	POST OFFICE	
		BLR-1
5309	GUEST HOUSE	
		BLR-1
5315	MORRIS HILL CHAPEL	
		BLR-1
5800	YOUTH CTR	
		BLR-1
		BLR-2
6914	EXC MAIN RETL	
		BLR-1
6940	INDOOR SWIM POOL	
		BLR-1
7028	BN CLASSROOMS	
		BLR-1
7031	BN HQ BLDG	
		BLR-1
7033	BN HQ BLDG	
		BLR-1
7036	REGIMENTAL HQ BLDG	
		BLR-1
7046	BN CLASSROOMS	
		BLR-1
7047	BN HQ BLDG	
		BLR-1
7048	BN HQ BLDG	

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 1 Small hot water boiler

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		BLR-1
7050	ENL BARRACKS W/AS	
		BLR-1
		BLR-2
		BLR-4
7053	ENL BARRACKS W/AS	
		BLR-1
		BLR-2
		BLR-3
7086	UNIT CHAPEL	
		BLR-1
7109	BN ADMIN & CLRM	
		BLR-1
7215	BN HQ BLDG	
		BLR-1
7218	BN HQ BLDG	
		BLR-1
7220	CO HQ BLDG	
		BLR-1
7243	ADMIN & SUPPORT BLDG	
		BLR-1
7270	BN HQ BLDG	
		BLR-1
7285	CLOTHING SALES	
		BLR-1
7404	ENL BARRACKS W/O DIN	
		BLR-1
7410	BN ADMIN & CLRM	
		BLR-1
7424	ENL BARRACKS W/O DIN	
		BLR-2
7432	ADMIN & SUPPORT BLDG	
		BLR-1
7450	REGIMENTAL HQ BLDG	
		BLR-1
7485	BOWLING ALLEY	
		BLR-1
7602	ADMIN & SUPPORT BLDG	
		BLR-1
7604	GEN INST BLDG	
		BLR-1
7608	ADMIN & SUPPORT BLDG	

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 1 Small hot water boiler

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
7610	ENL BARRACKS W/AS	BLR-1
7612	ENL BARRACKS W/AS	BLR-1
7614	ENL BARRACKS W/AS	BLR-1
7616	ENL BARRACKS W/AS	BLR-1
7618	ENL BARRACKS W/O DIN	BLR-1
7620	BN ADMIN & CLRM	BLR-1
7622	BN ADMIN & CLRM	BLR-1
7624	BN ADMIN & CLRM	BLR-1
7626	CLINIC W/O BEDS	BLR-1
7630	BN ADMIN & CLRM	BLR-1
7636	REGIMENTAL HQ BLDG	BLR-1
7638	BN ADMIN & CLRM	BLR-1
7642	ENL BARRACKS W/O DIN	BLR-1
7644	ENL BARRACKS W/O DIN	BLR-1
7646	ENL BARRACKS W/O DIN	BLR-1
7648	ENL BARRACKS W/O DIN	BLR-1
7650	ENL BARRACKS W/O DIN	BLR-1
7652	ADMIN & SUPPORT BLDG	BLR-1
7656	GEN INST BLDG	BLR-1
7658	ADMIN & SUPPORT BLDG	BLR-1
7739	MVNG TRGT SIM BLDG	BLR-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 1 Small hot water boiler

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
7802	ADMIN & SUPPORT BLDG	BLR-1
7808	ADMIN & SUPPORT BLDG	BLR
7810	ENL BARRACKS W/O DIN	BLR-1
7812	ENL BARRACKS W/O DIN	BLR-1
7814	ENL BARRACKS W/O DIN	BLR-1
7816	ENL BARRACKS W/O DIN	BLR-1
7818	ENL BARRACKS W/O DIN	BLR-1
7820	BN ADMIN & CLRM	BLR-1
7824	BN ADMIN & CLRM	BLR-1
7826	CLINIC W/O BEDS	BLR-1
7834	REGIMENTAL HQ BLDG	BLR-1
7836	BN ADMIN & CLRM	BLR-1
7842	ENL BARRACKS W/AS	BLR-1
7844	ENL BARRACKS W/O DIN	BLR-1
7846	ENL BARRACKS W/AS	BLR-1
7848	ENL BARRACKS W/O DIN	BLR-1
7850	ENL BARRACKS W/AS	BLR-1
7852	ADMIN & SUPPORT BLDG	BLR-1
7854	BN HQ BLDG	BLR-1
7865	UNIT CHAPEL	BLR-1
7866	THEATER W/DRESS RM	BLR-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 1 Small hot water boiler

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		BLR-1
8100	CONSOLIDATED MNT	
		BLR-1
		BLR-2
8330	VEH MNT SHOP ORG	
		BLR-1
8360	VEH MNT SHOP ORG	
		BLR-1
8390	TAC EQUIP SHOP	
		BLR-1

I/O SUMMARY TABLE

Date Prepared:
08-Dec-95

BUILDING NUMBER: TYPICAL

SYSTEM NO.: 3 - SMALL STEAM BOILER

GRAPHIC DISPLAY ●

HARDWARE – OUTPUT

	DIGITAL: CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACT	SOLENOID		ANALOG: POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA	ADJUST SPEED
BOILER	●									
SUPPLY STEAM										
SAFETY STATUS										
FLAME STATUS										
TOTAL	1	0	0	0	0	0	0	0	0	0

HARDWARE – INPUT

	DIGITAL: PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH	ANALOG: SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	REMOTE SETPNT OVERRIDE	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE
BOILER							●																		
SUPPLY STEAM																		●							
SAFETY STATUS							●																		
FLAME STATUS							●																		
TOTAL	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0

ALARM / SOFTWARE

	ALARM DIG: CONTACT CLOSURE		ALARM ANA: HIGH LIMIT	LOW LIMIT	RUN TIME	APPLICATION PROGRAMS: SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	DDC PROGRAMS: PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
BOILER	●				●																			O
SUPPLY STEAM			●	●																				C
SAFETY STATUS	●																							
FLAME STATUS	●																							

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 3 Small steam boiler

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0003	POST CHAPEL	
		BLR-1
0200	ADMIN GEN PURP	
		BLR-1
		BLR-2
0202	PHYS FITNESS CTR	
		BLR-1
0206	ADMIN GEN PURP	
		BLR-1
0211	ADMIN	
		BLR-1
		BLR-2
0214	ENL BARRACKS W/AS	
		BLR-1
		BLR-2
0223	ENL BARRACKS W/DAS	
		BLR-1
0227	ENL BARRACKS W/AS	
		BLR-1
		BLR-2
0301	FINANCE ADMIN	
		BLR-1
0402	ENL BARRACKS W/AS	
		BLR-1
0404	ENL BARRACKS W/DAS	
		BLR-1
0406	CID BLDG	
		BLR-1
0409	ENL BARRACKS W/AS	
		BLR-1
0410	ENL BARRACKS W/AS	
		BLR-1
0411	ENL BARRACKS W/AS	
		BLR-1
0500	POST HQ BLDG	
		BLR-1
0512	SR ENL QTRS	
		BLR-1
0602	DENTAL CLINIC	
		BLR-1
0723	MNT HANGAR COMB	
		BLR-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 3 Small steam boiler

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0727	MNT HANGAR COMB	BLR-1
0751	AC PTS & TOE ST	BLR-1
0760	BN HQ BLDG	BLR-1
5309	GUEST HOUSE	BLR-2
6620	COMMUN ACT CTR	BLR-1
7024	GYMNASIUM	BLR-1 BLR-2
7034	CLINIC W/O BEDS	BLR-1
7050	ENL BARRACKS W/AS	BLR-3
7176	MOTOR POOL MNT SHOP	BLR-1
7245	ENL PERS DIN	BLR-1
7264	LIBRARY MAIN	BLR-1
7404	ENL BARRACKS W/O DIN	BLR-2
7424	ENL BARRACKS W/O DIN	BLR-1
7606	ENL PERS DIN	BLR-1
7610	ENL BARRACKS W/AS	BLR-2
7612	ENL BARRACKS W/AS	BLR-2
7614	ENL BARRACKS W/AS	BLR-2
7616	ENL BARRACKS W/AS	BLR-2
7618	ENL BARRACKS W/O DIN	BLR-2
7632	GYMNASIUM	BLR-1 BLR-2

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 3 Small steam boiler

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
7642	ENL BARRACKS W/O DIN	
		BLR-2
7644	ENL BARRACKS W/O DIN	
		BLR-2
7646	ENL BARRACKS W/O DIN	
		BLR-2
7648	ENL BARRACKS W/O DIN	
		BLR-2
7650	ENL BARRACKS W/O DIN	
		BLR-2
7654	ENL PERS DIN	
		BLR-1
7665	DENTAL CLINIC	
		BLR-1
7670	DENTAL CLINIC	
		BLR-1
7804	ENL PERS DIN	
		BLR-1
7806	BN HQ BLDG	
		BLR-1
7810	ENL BARRACKS W/O DIN	
		BLR-2
7812	ENL BARRACKS W/O DIN	
		BLR-2
7814	ENL BARRACKS W/O DIN	
		BLR-2
7816	ENL BARRACKS W/O DIN	
		BLR-2
7818	ENL BARRACKS W/O DIN	
		BLR-2
7832	GYMNASIUM	
		BLR-1
		BLR-1
7842	ENL BARRACKS W/AS	
		BLR-2
7844	ENL BARRACKS W/O DIN	
		BLR-2
7846	ENL BARRACKS W/AS	
		BLR-2
7848	ENL BARRACKS W/O DIN	
		BLR-2
7850	ENL BARRACKS W/AS	

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 3 Small steam boiler

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		BLR-2
7856	ENL PERS DIN	
		BLR-1

Date Prepared:

12-Sep-95

I/O SUMMARY TABLE

BUILDING NUMBER

TYPICAL

SYSTEM NO.:

4 - LARGE STEAM BOILER

GRAPHIC DISPLAY ●

HARDWARE – OUTPUT

	DIGITAL: CONTROL RELAY W/H-O-A	DIGITAL: CONTROL RELAY	DIGITAL: CONTROL RELAY W/CONTACTOR	DIGITAL: SOLENOID	DIGITAL:	ANALOG: POSITION DAMPER	ANALOG: POSITION VALVE	ANALOG: POSITION DECK	ANALOG: CPA	ANALOG: ADJUST SPEED
STEAM BOILER										
STEAM SUPPLY										
STACK TEMPERATURE										
OXYGEN ANALYZER										
FLAME STATUS										
ALARM STATUS										
OUTSIDE AIR (COMMON)										
TOTAL	0	0	0	0	0	0	0	0	0	0

HARDWARE – INPUT – DIGITAL

	PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH
STEAM BOILER					●		●			
STEAM SUPPLY										
STACK TEMPERATURE										
OXYGEN ANALYZER										
FLAME STATUS							●			
ALARM STATUS							●			
OUTSIDE AIR (COMMON)										
TOTAL	0	0	0	0	1	0	3	0	0	0

HARDWARE – INPUT – ANALOG

	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	REMOTE SETPNT OVERRIDE	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE
STEAM BOILER															
STEAM SUPPLY								●							
STACK TEMPERATURE													●		
OXYGEN ANALYZER														●	
FLAME STATUS															
ALARM STATUS															
OUTSIDE AIR (COMMON)															●
TOTAL	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1

HARDWARE – ALARM; SOFTWARE

	ALARM DIG: CONTACT CLOSURE	ALARM DIG:	ALARM ANA: HIGH LIMIT	ALARM ANA: LOW LIMIT	ALARM ANA: RUN TIME	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	UNOCCUPIED OVERRIDE	DDC PROGRAMS: PROPORTIONAL CONTROL	DDC PROGRAMS: PI CONTROL	DDC PROGRAMS: PID CONTROL	DDC PROGRAMS:	FAILURE MODE
STEAM BOILER	●				●																			O
STEAM SUPPLY			●	●																				C
STACK TEMPERATURE			●	●																				
OXYGEN ANALYZER			●	●																				
FLAME STATUS	●				●																			
ALARM STATUS	●																							
OUTSIDE AIR (COMMON)																								

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 4 Large steam boiler

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0741	MNT HANGAR COMB	
		BLR-1

I/O SUMMARY TABLE

Date Prepared:
12-Sep-95

BUILDING NUMBER
TYPICAL

SYSTEM NO.:
5 - STEAM TO HOT WATER CONVERTER

GRAPHIC DISPLAY ●

HARDWARE – OUTPUT

	DIGITAL: CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACTOR	SOLENOID		ANALOG: POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA	ADJUST SPEED
STEAM TO HW CONVERTER										
HW SUPPLY										
HW RETURN										
PUMP	●									
STEAM VALVE							●			
OUTSIDE AIR (COMMON)										
TOTAL	1	0	0	0	0	0	1	0	0	0

HARDWARE – INPUT – DIGITAL

	PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH
STEAM TO HW CONVERTER										
HW SUPPLY										
HW RETURN										
PUMP			●							
STEAM VALVE										
OUTSIDE AIR (COMMON)										
TOTAL	0	0	1	0	0	0	0	0	0	0

HARDWARE – INPUT – ANALOG

	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	KW	AMPS	REMOTE SETPNT OVERRIDE	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE
STEAM TO HW CONVERTER															
HW SUPPLY					●										
HW RETURN					●										
PUMP															
STEAM VALVE															
OUTSIDE AIR (COMMON)															●
TOTAL	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1

HARDWARE – ALARM

	DIG: CONTACT CLOSURE		ANA: HIGH LIMIT	LOW LIMIT	RUN TIME
STEAM TO HW CONVERTER					
HW SUPPLY			●	●	
HW RETURN			●	●	
PUMP	●				●
STEAM VALVE					
OUTSIDE AIR (COMMON)					

SOFTWARE

	APPLICATION PROGRAMS: SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	UNOCCUPIED OVERRIDE	DDC PROGRAMS: PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
STEAM TO HW CONVERTER																			
HW SUPPLY										●									
HW RETURN																			
PUMP	●	●			●														O
STEAM VALVE										●						●			C
OUTSIDE AIR (COMMON)					●														

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 5 Steam to hot water converter

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0301	FINANCE ADMIN	CV-1
0512	SR ENL QTRS	CV-1
0602	DENTAL CLINIC	CV-1
0610	ENL BARRACKS W/AS	CV-1
0620	OFF QTRS MILIT	CV-1
0621	OFF QTRS TRANS	CV-1
0723	MNT HANGAR COMB	CV-1
0727	MNT HANGAR COMB	CV-1
6620	COMMUN ACT CTR	CV-1
7050	ENL BARRACKS W/AS	CV-1
7245	ENL PERS DIN	CV-1
7606	ENL PERS DIN	CV-1
7654	ENL PERS DIN	CV-1
7670	DENTAL CLINIC	CV-1
7804	ENL PERS DIN	CV-1
7806	BN HQ BLDG	CV-1
7856	ENL PERS DIN	CV-1
8002	ENL BARRACKS W/O DIN	CV-1
8006	ENL BARRACKS W/O DIN	CV-1
8008	ENL BARRACKS W/O DIN	CV-1
8012	ENL BARRACKS W/O DIN	CV-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 5 Steam to hot water converter

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
8014	ENL BARRACKS W/O DIN	CV-1
8021	ADMIN & SUPPORT BLDG	CV-1
8023	ADMIN & SUPPORT BLDG	CV-1
8025	BN ADMIN & CLRM	CV-1
8037	BN ADMIN & CLRM	CV-1
8038	ENL BARRACKS W/O DIN	CV-1
8040	ENL BARRACKS W/O DIN	CV-1
8042	ENL BARRACKS W/O DIN	CV-1
8048	ENL BARRACKS W/O DIN	CV-1
8050	ENL BARRACKS W/O DIN	CV-1
8052	SR ENL QTRS	CV-1
8054	ENL BARRACKS W/O DIN	CV-1
8057	ADMIN & SUPPORT BLDG	CV-1
8059	ADMIN & SUPPORT BLDG	CV-1
8065	CLINIC W/O BEDS	CV-1
8069	IN SW POOL/GYM	CV-1
8370	VEH MNT SHOP ORG	CV-1

Date Prepared:

12-Sep-95

I/O SUMMARY TABLE

BUILDING NUMBER

TYPICAL

SYSTEM NO.:
6 - SMALL AIR COOLED CHILLER

GRAPHIC DISPLAY ●

HARDWARE – OUTPUT

	DIGITAL: CONTROL RELAY W/H-O-A	DIGITAL: CONTROL RELAY	DIGITAL: CONTROL RELAY W/CONTACTOR	DIGITAL: SOLENOID	DIGITAL:	ANALOG: POSITION DAMPER	ANALOG: POSITION VALVE	ANALOG: POSITION DECK	ANALOG: CPA	ANALOG: ADJUST SPEED
AIR COOLED CHILLER	●									
CHW SUPPLY										
CHW RETURN										
CHW RESET										
COMPRESSOR 1										
COMPRESSOR 2										
CHW PUMP	●									
OUTSIDE AIR (COMMON)										
TOTAL	2	0	0	0	0	0	0	0	0	0

HARDWARE – INPUT

	DIGITAL: PRESSURE SWITCH	DIGITAL: DIFF. PRESS. SW. (AIR)	DIGITAL: DIFF. PRESS. SW. (WATER)	DIGITAL: CURRENT SWITCH	DIGITAL: AUXILIARY CONTACT	DIGITAL: PULSE	DIGITAL: STATUS RELAY	DIGITAL: LEVEL SWITCH	DIGITAL: TEMPERATURE SWITCH	DIGITAL: PUSH BUTTON SWITCH	ANALOG: SPACE TEMPERATURE	ANALOG: SPACE TEMPERATURE (VAV)	ANALOG: DUCT TEMPERATURE	ANALOG: AVG. TEMPERATURE	ANALOG: WATER TEMPERATURE	ANALOG: SPACE RELATIVE HUMIDITY	ANALOG: DUCT RELATIVE HUMIDITY	ANALOG: PSI/PSIG	ANALOG: FLOW	ANALOG: kW	ANALOG: AMPS	ANALOG: REMOTE SETPNT OVERRIDE	ANALOG: STACK TEMPERATURE	ANALOG: OXYGEN ANALYZER	ANALOG: OUTSIDE AIR TEMPERATURE
AIR COOLED CHILLER																									
CHW SUPPLY															●										
CHW RETURN															●										
CHW RESET																									
COMPRESSOR 1				●																					
COMPRESSOR 2				●																					
CHW PUMP			●																						
OUTSIDE AIR (COMMON)																									
TOTAL	0	0	1	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0

HARDWARE – ALARM / SOFTWARE

	ALARM DIG: CONTACT CLOSURE	ALARM DIG:	ALARM ANA: HIGH LIMIT	ALARM ANA: LOW LIMIT	ALARM ANA: RUN TIME	APPLICATION PROGRAMS: SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	UNOCCUPIED OVERRIDE	DDC PROGRAMS: PROPORTIONAL CONTROL	DDC PROGRAMS: PI CONTROL	DDC PROGRAMS: PID CONTROL	DDC PROGRAMS:	FAILURE MODE
AIR COOLED CHILLER					●	●	●		●	●														O
CHW SUPPLY			●	●												●								
CHW RETURN			●	●																				
CHW RESET																								
COMPRESSOR 1	●																							
COMPRESSOR 2	●																							
CHW PUMP	●				●	●	●		●	●														O
OUTSIDE AIR (COMMON)									●															

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 6 Small air cooled chiller

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0222	ADMIN GEN PURP	
		CH-1
0227	ENL BARRACKS W/AS	
		CH-1
0253	DRUG ABUSE CTR	
		CH-1
0402	ENL BARRACKS W/AS	
		CH-1
0404	ENL BARRACKS W/DAS	
		CH-1
		CH-2
0405	ADMIN GEN PURP	
		CH-1
0409	ENL BARRACKS W/AS	
		CH-1
0410	ENL BARRACKS W/AS	
		CH-1
0411	ENL BARRACKS W/AS	
		CH-1
0512	SR ENL QTRS	
		CH-2
0541	OFF QTRS MILIT	
		CH-1
0722	FLIGHT SIMULATOR	
		CH-1
		CH-2
0724	FLIGHT SIMULATOR	
		CH-1
		CH-2
0814	MEDICAL FAC - NEW	
		CH-1
4010	DENTAL CLINIC	
		CH-1
5309	GUEST HOUSE	
		CH-1
5315	MORRIS HILL CHAPEL	
		CH-1
		CH-2
		CH-3
5800	YOUTH CTR	
		CH-1
6620	COMMUN ACT CTR	

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 6 Small air cooled chiller

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
7109	BN ADMIN & CLRM	CH-1
7218	BN HQ BLDG	CH-1
7220	CO HQ BLDG	CH-1
7264	LIBRARY MAIN	CH-1
7410	BN ADMIN & CLRM	CH-1
7432	ADMIN & SUPPORT BLDG	CH-1
7450	REGIMENTAL HQ BLDG	CH-1
7602	ADMIN & SUPPORT BLDG	CH-1
7604	GEN INST BLDG	CH-1
7606	ENL PERS DIN	CH-1
7608	ADMIN & SUPPORT BLDG	CH-1
7610	ENL BARRACKS W/AS	CH-1
7612	ENL BARRACKS W/AS	CH-1
7614	ENL BARRACKS W/AS	CH-1
7616	ENL BARRACKS W/AS	CH-1
7618	ENL BARRACKS W/O DIN	CH-1
7622	BN ADMIN & CLRM	CH-1
7626	CLINIC W/O BEDS	CH-1
7636	REGIMENTAL HQ BLDG	CH-1
7642	ENL BARRACKS W/O DIN	CH-1
7644	ENL BARRACKS W/O DIN	CH-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 6 Small air cooled chiller

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
7646	ENL BARRACKS W/O DIN	CH-1
7648	ENL BARRACKS W/O DIN	CH-1
7650	ENL BARRACKS W/O DIN	CH-1
7652	ADMIN & SUPPORT BLDG	CH-1
7654	ENL PERS DIN	CH-1
7656	GEN INST BLDG	CH-1
7658	ADMIN & SUPPORT BLDG	CH-1
7665	DENTAL CLINIC	CH-1
7670	DENTAL CLINIC	CH-1
7802	ADMIN & SUPPORT BLDG	CH-1
7804	ENL PERS DIN	CH-1
7806	BN HQ BLDG	CH-1
7808	ADMIN & SUPPORT BLDG	CH-1
7810	ENL BARRACKS W/O DIN	CH-1
7812	ENL BARRACKS W/O DIN	CH-1
7814	ENL BARRACKS W/O DIN	CH-1
7816	ENL BARRACKS W/O DIN	CH-1
7818	ENL BARRACKS W/O DIN	CH-1
7824	BN ADMIN & CLRM	CH-1
7834	REGIMENTAL HQ BLDG	CH-1
7836	BN ADMIN & CLRM	CH-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 6 Small air cooled chiller

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		CH-1
7842	ENL BARRACKS W/AS	
		CH-1
7844	ENL BARRACKS W/O DIN	
		CH-1
7846	ENL BARRACKS W/AS	
		CH-1
7848	ENL BARRACKS W/O DIN	
		CH-1
7850	ENL BARRACKS W/AS	
		CH-1
7852	ADMIN & SUPPORT BLDG	
		CH-1
		CH-2
7854	BN HQ BLDG	
		CH-1
7856	ENL PERS DIN	
		CH-1
7858	ADMIN & SUPPORT BLDG	
		CH-1
8100	CONSOLIDATED MNT	
		CH-6
		CH-8

Date Prepared:

12-Sep-95

I/O SUMMARY TABLE

BUILDING NUMBER	HARDWARE																			
TYPICAL	OUTPUT										INPUT									
	DIGITAL					ANALOG					DIGITAL									
SYSTEM NO.: 7 - LARGE AIR COOLED CHILLER	CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACTOR	SOLENOID		POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA	ADJUST SPEED	PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH
GRAPHIC DISPLAY ●																				
AIR COOLED CHILLER	●																			
CHW SUPPLY																				
CHW RETURN																				
CHW RESET																				
COMPRESSOR 1 STAGE 1		●												●						
COMPRESSOR 1 STAGE 2		●																		
COMPRESSOR 2 STAGE 1		●												●						
COMPRESSOR 2 STAGE 2		●																		
CHW PUMP	●												●							
SPACE HUMIDITY (COMMON)																				
OUTSIDE AIR (COMMON)																				
TOTAL	2	4	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0

	HARDWARE																			
	INPUT															ALARM				
	ANALOG															DIG		ANA		
	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	REMOTE SETPNT OVERRIDE	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE	CONTACT CLOSURE		HIGH LIMIT	LOW LIMIT	RUN TIME
GRAPHIC DISPLAY ●																				
AIR COOLED CHILLER																				
CHW SUPPLY					●													●	●	
CHW RETURN					●													●	●	
CHW RESET																				
COMPRESSOR 1 STAGE 1																●				●
COMPRESSOR 1 STAGE 2																				
COMPRESSOR 2 STAGE 1																●				●
COMPRESSOR 2 STAGE 2																				
CHW PUMP																●				●
SPACE HUMIDITY (COMMON)						●												●	●	
OUTSIDE AIR (COMMON)															●					
TOTAL	0	0	0	0	2	1	0	0	0	0	0	0	0	0	1					

	SOFTWARE																		
	APPLICATION PROGRAMS														DDC PROGRAMS				
	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	UNOCCUPIED OVERRIDE	PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
GRAPHIC DISPLAY ●																			
AIR COOLED CHILLER	●	●		●	●														O
CHW SUPPLY											●								
CHW RETURN											●								
CHW RESET											●								
COMPRESSOR 1 STAGE 1				●							●								
COMPRESSOR 1 STAGE 2				●							●								
COMPRESSOR 2 STAGE 1				●							●								
COMPRESSOR 2 STAGE 2				●							●								
CHW PUMP	●	●		●	●														O
SPACE HUMIDITY (COMMON)											●								
OUTSIDE AIR (COMMON)					●														

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 7 Large air cooled chiller

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0202	PHYS FITNESS CTR	
		CH-1
0203	CAVALRY MUSEUM	
		CH-1
0206	ADMIN GEN PURP	
		CH-1
0207	CAVALRY MUSEUM	
		CH-1
0210	MILIT PERS BLDG	
		CH-1
0214	ENL BARRACKS W/AS	
		CH-1
0223	ENL BARRACKS W/DAS	
		CH-1
0602	DENTAL CLINIC	
		CH-1
0610	ENL BARRACKS W/AS	
		CH-1
0806	COMB AC-HTG PLANT	
		CH-1
		CH-2
6914	EXC MAIN RETL	
		CH-1
		CH-2

Date Prepared:

12-Sep-95

I/O SUMMARY TABLE

BUILDING NUMBER: TYPICAL

SYSTEM NO.: 8 - AIR COOLED DX COMPRESSOR

HARDWARE – OUTPUT

	DIGITAL: CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACTOR	SOLENOID		ANALOG: POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA	ADJUST SPEED
GRAPHIC DISPLAY ●										
AIR COOLED DX COMPRESSOR	●									
TOTAL	1	0	0	0	0	0	0	0	0	0

HARDWARE – INPUT

	DIGITAL: PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH	ANALOG: SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	KW	AMPS	REMOTE SETPNT OVERRIDE	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE
GRAPHIC DISPLAY ●																									
AIR COOLED DX COMPRESSOR							●																		
TOTAL	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

HARDWARE – ALARM / SOFTWARE

	ALARM DIG: CONTACT CLOSURE		ALARM ANA: HIGH LIMIT	LOW LIMIT	RUN TIME	APPLICATION PROGRAMS: SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	UNOCCUPIED OVERRIDE	DDC PROGRAMS: PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
GRAPHIC DISPLAY ●																								
AIR COOLED DX COMPRESSOR	●				●	●	●		●	●														O

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 8 Air cooled DX compressor

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0029	RED CROSS BLDG	
		CH-1
		CH-2
0211	ADMIN	
		ACCU-1
0301	FINANCE ADMIN	
		CH-1
		CH-2
		CH-3
0302	FINANCE ADMIN	
		ACCU-1
		CH-1
0313	CIV PERS BLDG	
		CH-1
0319	GEN INSTR BLDG	
		CH-1
0330	DEH ADMIN	
		CH-1
		CH-2
		CH-3
		CH-4
		CH-5
		CH-6
0364	UEMCS HQ	
		CH-1
0406	CID BLDG	
		CH-1
0512	SR ENL QTRS	
		CH-1
0540	OFF QTRS MILIT	
		CH-1
0542	OFF QTRS MILIT	
		CH-1
0652	COLD STOR FAC	
		CH-1
		CH-2
0710	TAC EQUIP SHOP	
		ACCU-1
0720	AF OPS BLDG	
		CH-1
		CH-2
		CH-3

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 8 Air cooled DX compressor

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0724	FLIGHT SIMULATOR	
		CH-3
		CH-4
0727	MNT HANGAR COMB	
		ACCU-1
		ACCU-2
0751	AC PTS & TOE ST	
		CH-1
0817	MNT HANGAR AVUM	
		CH-1
		CH-2
		CH-3
0820	TAC EQUIP SHOP	
		ACCU-1
0833	AIRCRAFT HANGAR	
		CH-1
		CH-2
0835	MAF OPS BLDG	
		CH-1
0840	VEHICLE MNT SHOP ORG	
		CH-1
0853	MNT HANGAR AVUM	
		CH-1
		CH-2
		CH-3
1470	AR VEH MNT SHOP	
		ACCU-1
		ACCU-2
5000	FIRE STATION	
		CH-1
5302	POST OFFICE	
		CH-1
6910	EXC SP ST FAC	
		CH-1
		CH-2
7017	BN HQ BLDG	
		ACCU-1
7086	UNIT CHAPEL	
		CH-1
		CH-2
7215	BN HQ BLDG	
		CH-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 8 Air cooled DX compressor

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
7264	LIBRARY MAIN	
		CH-2
7270	BN HQ BLDG	
		CH-1
7305	APP INSTR BLDG	
		ACCU-1
		ACCU-2
		ACCU-3
		ACCU-4
7485	BOWLING ALLEY	
		CH-1
		CH-2
7620	BN ADMIN & CLRM	
		CH-1
7624	BN ADMIN & CLRM	
		CH-1
7630	BN ADMIN & CLRM	
		CH-1
7638	BN ADMIN & CLRM	
		CH-1
7739	MVNG TRGT SIM BLDG	
		CH-1
7820	BN ADMIN & CLRM	
		CH-1
7826	CLINIC W/O BEDS	
		CH-1
7865	UNIT CHAPEL	
		CH-1
		CH-2
7866	THEATER W/DRESS RM	
		ACCU-1
		CH-1
7920	VEH MNT SHOP DS	
		ACCU-1
		ACCU-2
		ACCU-3
		ACCU-4
		ACCU-5
		ACCU-6
		ACCU-7
8044	APP INSTR BLDG	
		CH-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 8 Air cooled DX compressor

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
8100	CONSOLIDATED MNT	
		CH-1
		CH-2
		CH-3
		CH-4
		CH-5
		CH-7
8330	VEH MNT SHOP ORG	
		ACCU-1
8360	VEH MNT SHOP ORG	
		ACCU-1
8370	VEH MNT SHOP ORG	
		CH-1
		CH-2
8380	VEH MNT SHOP ORG	
		CH-1
		CH-2
		CH-3
		CH-4
		CH-5
8390	TAC EQUIP SHOP	
		CH-1
8410	VEH MNT SHOP ORG	
		CH-1
		CH-2
		CH-3
		CH-4
		CH-5

I/O SUMMARY TABLE

Date Prepared:
12-Sep-95

BUILDING NUMBER: TYPICAL	HARDWARE																																								SOFTWARE																		
	OUTPUT										INPUT																									ALARM					APPLICATION PROGRAMS														DDC PROGRAMS				
	DIGITAL					ANALOG					DIGITAL										ANALOG															DIG		ANA																					
SYSTEM NO.: 9 - WATER COOLED CHILLER	CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACT	SOLENOID		POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA	ADJUST SPEED	PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	REMOTE SETPNT OVERRIDE	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE	CONTACT CLOSURE		HIGH LIMIT	LOW LIMIT	RUN TIME	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
GRAPHIC DISPLAY ●																																																											
WATER COOLED CHILLER	●																																							●	●	●		●	●														O
CHW SUPPLY																									●													●	●												●								
CHW RETURN																									●													●	●												●								
CHW RESET									●																																										●								
COOLING TOWER		●												●																						●																		●					O
CNW SUPPLY																									●													●	●															●					
CNW RETURN																									●													●	●															●					
CHW PUMP	●												●																											●	●	●		●	●														O
TOWER BYPASS VALVE							●																																															●					
OIL PRESSURE																												●																															
HEAD PRESSURE																												●																															
SUCTION PRESSURE																												●																															
AMP																															●																												
kW																														●																													
DEMAND									●																																			●															
CNW PUMP	●													●																																													O
SPACE HUMIDITY (COMMON)																											●											●	●												●								
OUTSIDE AIR (COMMON)																																			●										●									●					
TOTAL	3	1	0	0	0	0	1	0	2	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	4	0	1	3	0	1	1	0	0	0	1																								

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 9 Water cooled chiller

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
7285	CLOTHING SALES	
		CH-1

I/O SUMMARY TABLE

Date Prepared:

09-Dec-95

BUILDING NUMBER TYPICAL	HARDWARE																																								SOFTWARE																		
	OUTPUT										INPUT																									ALARM					APPLICATION PROGRAMS														DDC PROGRAMS				
	DIGITAL					ANALOG					DIGITAL										ANALOG															DIG		ANA																					
SYSTEM NO.: 10 - MULTIZONE AHU	CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACT	SOLENOID		POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA	ADJUST SPEED	PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	REMOTE SETPNT OVERRIDE	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE	CONTACT CLOSURE		HIGH LIMIT	LOW LIMIT	RUN TIME	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
GRAPHIC DISPLAY ●																																																											
SUPPLY FAN	●																														●							●	●	●	●	●		●	●														C
RETURN FAN (NONE)																																																											
RA/OA/EA DAMPER						●																																								●	●												C
COOLING COIL							●																																									●								●			F
HEATING COIL							●																																									●								●			O
COLD DECK																							●															●	●																				
HOT DECK																							●															●	●																				
RETURN AIR																							●															●	●							●													
MIXED AIR																								●														●	●							●													
ZONE 1						●																																																		●			
ZONE 2						●																																																		●			
ZONE 3						●																																																		●			
ZONE 4						●																																																		●			
ZONE 5						●																																																		●			
SPACE 1																					●																	●	●			●			●			●											
SPACE 2																					●																	●	●			●			●			●											
SPACE 3																					●																	●	●			●			●			●											
SPACE 4																					●																	●	●			●			●			●											
SPACE 5																					●																	●	●			●			●			●											
FILTER												●																								●																							
OUTSIDE AIR (COMMON)																																			●							●			●	●													
TOTAL	1	0	0	0	0	6	2	0	0	0	0	1	0	0	0	0	0	0	0	0	5	0	3	1	0	0	0	0	0	0	1	0	0	0	1																								

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 10 Multizone air handling unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0210	MILIT PERS BLDG	
		AHU-1
		AHU-2
		AHU-6
0214	ENL BARRACKS W/AS	
		AHU-1
		AHU-2
0223	ENL BARRACKS W/DAS	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
0227	ENL BARRACKS W/AS	
		AHU-1
		AHU-2
0402	ENL BARRACKS W/AS	
		AHU-1
		AHU-2
		AHU-3
0409	ENL BARRACKS W/AS	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
0410	ENL BARRACKS W/AS	
		AHU-1
		AHU-2
		AHU-3
0411	ENL BARRACKS W/AS	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
0724	FLIGHT SIMULATOR	
		AHU-1
0802	BN ADMIN & CLRM	
		AHU-1
0804	RGT HQ BUILD	
		AHU-1
0808	BN ADMIN & CLRM	
		AHU-1
0814	MEDICAL FAC - NEW	

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 10 Multizone air handling unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		AHU-1
5000	FIRE STATION	AHU-1
5302	POST OFFICE	AHU-1
5800	YOUTH CTR	AHU-1
6620	COMMUN ACT CTR	AHU-1
6914	EXC MAIN RETL	AHU-4
		AHU-5
7034	CLINIC W/O BEDS	AHU-1
7108	BN ADMIN & CLRM	AHU-1
7218	BN HQ BLDG	AHU-1
7270	BN HQ BLDG	AHU-1
7404	ENL BARRACKS W/O DIN	AHU-1
		AHU-2
7424	ENL BARRACKS W/O DIN	AHU-1
		AHU-2
7604	GEN INST BLDG	AHU-1
		AHU-2
7618	ENL BARRACKS W/O DIN	AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6
7620	BN ADMIN & CLRM	AHU-1
7622	BN ADMIN & CLRM	AHU-1
		AHU-2
		AHU-3

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 10 Multizone air handling unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
7624	BN ADMIN & CLRM	
		AHU-1
7626	CLINIC W/O BEDS	
		AHU-1
7630	BN ADMIN & CLRM	
		AHU-1
7638	BN ADMIN & CLRM	
		AHU-1
7642	ENL BARRACKS W/O DIN	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6
7644	ENL BARRACKS W/O DIN	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6
7646	ENL BARRACKS W/O DIN	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6
7648	ENL BARRACKS W/O DIN	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6
7650	ENL BARRACKS W/O DIN	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 10 Multizone air handling unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		AHU-6
7656	GEN INST BLDG	
		AHU-1
		AHU-2
7665	DENTAL CLINIC	
		AHU-1
7739	MVNG TRGT SIM BLDG	
		AHU-1
7820	BN ADMIN & CLRM	
		AHU-1
7824	BN ADMIN & CLRM	
		AHU-1
		AHU-2
		AHU-3
7826	CLINIC W/O BEDS	
		AHU-1
7836	BN ADMIN & CLRM	
		AHU-1
		AHU-2
		AHU-3
8025	BN ADMIN & CLRM	
		AHU-1
		AHU-2
		AHU-3
8037	BN ADMIN & CLRM	
		AHU-1
		AHU-2
		AHU-3
8063	ENL PERS DIN	
		AHU-1
8065	CLINIC W/O BEDS	
		AHU-1
8071	RGT HQ BUILD	
		AHU-1
8360	VEH MNT SHOP ORG	
		AHU-1

I/O SUMMARY TABLE

Date Prepared:

09-Dec-95

HARDWARE — OUTPUT (DIGITAL, ANALOG) / INPUT (DIGITAL)

BUILDING NUMBER: TYPICAL SYSTEM NO.: 11 - VAV AHU	CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACT	SOLENOID		POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA	ADJUST SPEED	PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH
	OUTPUT – DIGITAL					OUTPUT – ANALOG					INPUT – DIGITAL									
GRAPHIC DISPLAY ●																				
SUPPLY FAN	●																			
RETURN FAN (NONE)																				
RA/OA/EA DAMPERS						●														
COOLING COIL							●													
HEATING COIL							●													
SUPPLY AIR																				
RETURN AIR																				
MIXED AIR																				
SUPPLY FAN VAV										●										
VAV BOX 1 - DAMPER & REHEAT COIL						●	●													
SPACE & SETPOINT																				●
VAV BOX 2 - DAMPER & REHEAT COIL						●	●													
SPACE & SETPOINT																				●
VAV BOX 3 - DAMPER & REHEAT COIL						●	●													
SPACE & SETPOINT																				●
VAV BOX 4 - DAMPER & REHEAT COIL						●	●													
SPACE & SETPOINT																				●
VAV BOX 5 - DAMPER & REHEAT COIL						●	●													
SPACE & SETPOINT																				●
VAV BOX 6 - DAMPER & REHEAT COIL						●	●													
SPACE & SETPOINT																				●
VAV BOX 7 - DAMPER & REHEAT COIL						●	●													
SPACE & SETPOINT																				●
VAV BOX 8 - DAMPER & REHEAT COIL						●	●													
SPACE & SETPOINT																				●
FILTER												●								
OUTSIDE AIR (COMMON)																				
TOTAL	1	0	0	0	0	9	10	0	0	1	0	1	0	0	0	0	0	0	0	8

HARDWARE — INPUT (ANALOG) / ALARM (DIG, ANA)

BUILDING NUMBER: TYPICAL SYSTEM NO.: 11 - VAV AHU	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	KW	AMPS	REMOTE SETPNT OVERRIDE	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE	CONTACT CLOSURE		HIGH LIMIT	LOW LIMIT	RUN TIME
	INPUT – ANALOG															ALARM – DIG		ALARM – ANA		
GRAPHIC DISPLAY ●																				
SUPPLY FAN											●							●	●	●
RETURN FAN (NONE)																				
RA/OA/EA DAMPERS																				
COOLING COIL																				
HEATING COIL																				
SUPPLY AIR			●															●	●	
RETURN AIR			●															●	●	
MIXED AIR				●														●	●	
SUPPLY FAN VAV								●										●	●	
VAV BOX 1 - DAMPER & REHEAT COIL									●											
SPACE & SETPOINT		●										●						●	●	
VAV BOX 2 - DAMPER & REHEAT COIL									●											
SPACE & SETPOINT		●										●						●	●	
VAV BOX 3 - DAMPER & REHEAT COIL									●											
SPACE & SETPOINT		●										●						●	●	
VAV BOX 4 - DAMPER & REHEAT COIL									●											
SPACE & SETPOINT		●										●						●	●	
VAV BOX 5 - DAMPER & REHEAT COIL									●											
SPACE & SETPOINT		●										●						●	●	
VAV BOX 6 - DAMPER & REHEAT COIL									●											
SPACE & SETPOINT		●										●						●	●	
VAV BOX 7 - DAMPER & REHEAT COIL									●											
SPACE & SETPOINT		●										●						●	●	
VAV BOX 8 - DAMPER & REHEAT COIL									●											
SPACE & SETPOINT		●										●						●	●	
FILTER																●				
OUTSIDE AIR (COMMON)															●					
TOTAL	0	8	2	1	0	0	0	1	8	0	1	8	0	0	1					

SOFTWARE — APPLICATION PROGRAMS / DDC PROGRAMS

BUILDING NUMBER: TYPICAL SYSTEM NO.: 11 - VAV AHU	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	UNOCCUPIED OVERRIDE	PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
	APPLICATION PROGRAMS														DDC PROGRAMS				
GRAPHIC DISPLAY ●																			
SUPPLY FAN	●	●		●	●														C
RETURN FAN (NONE)																			
RA/OA/EA DAMPERS						●	●												C
COOLING COIL																●			F
HEATING COIL																●			O
SUPPLY AIR						●													
RETURN AIR						●													
MIXED AIR						●													
SUPPLY FAN VAV																●			C
VAV BOX 1 - DAMPER & REHEAT COIL													●			●			C
SPACE & SETPOINT					●									●					
VAV BOX 2 - DAMPER & REHEAT COIL													●			●			C
SPACE & SETPOINT					●									●					
VAV BOX 3 - DAMPER & REHEAT COIL													●			●			C
SPACE & SETPOINT					●									●					
VAV BOX 4 - DAMPER & REHEAT COIL													●			●			C
SPACE & SETPOINT					●									●					
VAV BOX 5 - DAMPER & REHEAT COIL													●			●			C
SPACE & SETPOINT					●									●					
VAV BOX 6 - DAMPER & REHEAT COIL													●			●			C
SPACE & SETPOINT					●									●					
VAV BOX 7 - DAMPER & REHEAT COIL													●			●			C
SPACE & SETPOINT					●									●					
VAV BOX 8 - DAMPER & REHEAT COIL													●			●			C
SPACE & SETPOINT					●									●					
FILTER																			
OUTSIDE AIR (COMMON)		●			●	●													

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 11 Variable Air Volume air handling unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0301	FINANCE ADMIN	
		AHU-1
		AHU-2
		AHU-3
0302	FINANCE ADMIN	
		AHU-1
0722	FLIGHT SIMULATOR	
		AHU-1
0835	MAF OPS BLDG	
		AHU-1
7109	BN ADMIN & CLRM	
		AHU-1
7245	ENL PERS DIN	
		AHU-1
		AHU-2
7410	BN ADMIN & CLRM	
		AHU-1
7485	BOWLING ALLEY	
		AHU-2
7606	ENL PERS DIN	
		AHU-1
		AHU-2
7654	ENL PERS DIN	
		AHU-1
		AHU-2
8100	CONSOLIDATED MNT	
		AHU-6
		AHU-8

Date Prepared:

09-Dec-95

I/O SUMMARY TABLE

BUILDING NUMBER

TYPICAL

SYSTEM NO.:

13 - LARGE SINGLE ZONE AHU

	HARDWARE																			
	OUTPUT										INPUT									
	DIGITAL					ANALOG					DIGITAL									
	CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACT	SOLENOID		POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA	ADJUST SPEED	PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH
GRAPHIC DISPLAY ●																				
SUPPLY FAN	●																			
RETURN FAN (NONE)																				
OA/RA DAMPER						●														
COOLING COIL							●													
HEATING COIL							●													
SUPPLY AIR																				
RETURN AIR																				
MIXED AIR																				
SPACE 1																				
SPACE 2																				
FILTER												●								
OUTSIDE AIR (COMMON)																				
TOTAL	1	0	0	0	0	1	2	0	0	0	0	1	0	0	0	0	0	0	0	0

	HARDWARE																			
	INPUT															ALARM				
	ANALOG															DIG		ANA		
	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	REMOTE SETPNT OVERRIDE	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE	CONTACT CLOSURE		HIGH LIMIT	LOW LIMIT	RUN TIME
GRAPHIC DISPLAY																				
SUPPLY FAN											●							●	●	●
RETURN FAN (NONE)																				
OA/RA DAMPER																				
COOLING COIL																				
HEATING COIL																				
SUPPLY AIR			●															●	●	
RETURN AIR			●															●	●	
MIXED AIR				●														●	●	
SPACE 1	●																	●	●	
SPACE 2	●																	●	●	
FILTER																●				
OUTSIDE AIR (COMMON)															●					
TOTAL	2	0	2	1	0	0	0	0	0	0	1	0	0	0	1					

	SOFTWARE																		
	APPLICATION PROGRAMS														DDC PROGRAMS				
	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
GRAPHIC DISPLAY																			
SUPPLY FAN	●	●		●	●														C
RETURN FAN (NONE)																			
OA/RA DAMPER						●	●												C
COOLING COIL																●			F
HEATING COIL																●			O
SUPPLY AIR						●													
RETURN AIR						●													
MIXED AIR						●													
SPACE 1		●			●														
SPACE 2		●			●														
FILTER																			
OUTSIDE AIR (COMMON)		●			●	●													

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 13 Large Single Zone air handling unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0202	PHYS FITNESS CTR	
		AHU-2
0206	ADMIN GEN PURP	
		AHU-1
0210	MILIT PERS BLDG	
		AHU-3

I/O SUMMARY TABLE

Date Prepared:

09-Dec-95

BUILDING NUMBER: TYPICAL

SYSTEM NO.: 14 - LARGE SINGLE ZONE AHU with HUMIDIFICATION

HARDWARE – OUTPUT (DIGITAL, ANALOG) and INPUT (DIGITAL)

	OUTPUT DIGITAL: CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACT	SOLENOID		OUTPUT ANALOG: POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA	ADJUST SPEED	INPUT DIGITAL: PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH
GRAPHIC DISPLAY ●																				
SUPPLY FAN	●																			
RETURN FAN (NONE)																				
OA/RA DAMPER						●														
COOLING COIL							●													
HEATING COIL							●													
SUPPLY AIR																				
RETURN AIR																				
MIXED AIR																				
SPACE 1																				
SPACE 2																				
FILTER												●								
HUMIDIFIER							●													
OUTSIDE AIR (COMMON)																				
TOTAL	1	0	0	0	0	1	3	0	0	0	0	1	0	0	0	0	0	0	0	0

HARDWARE – INPUT (ANALOG) and ALARM

	INPUT ANALOG: SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	REMOTE SETPNT OVERRIDE	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE	ALARM DIG: CONTACT CLOSURE		ALARM ANA: HIGH LIMIT	LOW LIMIT	RUN TIME
GRAPHIC DISPLAY ●																				
SUPPLY FAN											●							●	●	●
RETURN FAN (NONE)																				
OA/RA DAMPER																				
COOLING COIL																		●	●	
HEATING COIL																		●	●	
SUPPLY AIR			●															●	●	
RETURN AIR			●															●	●	
MIXED AIR				●														●	●	
SPACE 1	●																	●	●	
SPACE 2	●																	●	●	
FILTER																●				
HUMIDIFIER						●												●	●	
OUTSIDE AIR (COMMON)															●					
TOTAL	2	0	2	1	0	1	0	0	0	0	1	0	0	0	1					

SOFTWARE – APPLICATION PROGRAMS and DDC PROGRAMS

	APPLICATION PROGRAMS: SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	DDC PROGRAMS: PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
GRAPHIC DISPLAY ●																			
SUPPLY FAN	●	●		●	●														C
RETURN FAN (NONE)																			
OA/RA DAMPER						●	●												C
COOLING COIL																●			F
HEATING COIL																●			O
SUPPLY AIR						●													
RETURN AIR						●													
MIXED AIR						●													
SPACE 1		●			●														
SPACE 2		●			●														
FILTER																			
HUMIDIFIER																●			F
OUTSIDE AIR (COMMON)		●			●	●													

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 14 Large Single Zone air handling unit with Humidification

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0203	CAVALRY MUSEUM	
		AHU-1
0205	CAVALRY MUSEUM	
		AHU-1
		AHU-2
0207	CAVALRY MUSEUM	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6

Date Prepared:

09-Dec-95

I/O SUMMARY TABLE

BUILDING NUMBER: TYPICAL	HARDWARE																																						SOFTWARE																		
	OUTPUT										INPUT																								ALARM					APPLICATION PROGRAMS														DDC PROGRAMS				
	DIGITAL					ANALOG					DIGITAL										ANALOG														DIG		ANA																					
SYSTEM NO.: 15 - SMALL SINGLE ZONE AHU	CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACTOR	SOLENOID		POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA		PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE	CONTACT CLOSURE		HIGH LIMIT	LOW LIMIT	RUN TIME	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
GRAPHIC DISPLAY •																																																										
SUPPLY FAN	•																														•						•	•	•	•	•		•	•														C
RETURN FAN (NONE)																																																										
OA/ RA/ EA DAMPERS						•																																							•	•												C
COOLING COIL							•																																																•			F
HEATING COIL							•																																																•			O
SUPPLY AIR																							•														•	•							•													
RETURN AIR																							•														•	•							•													
MIXED AIR																								•													•	•							•													
SPACE																					•																•	•			•			•														
OUTSIDE AIR (COMMON)																																		•							•			•	•													
TOTAL	1	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	1	0	0	0	0	0	0	1	0	0	1																								

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 15 Small Single Zone air handling unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0003	POST CHAPEL	
		AHU-1
0006	POST CHAPEL	
		AHU-1
		AHU-2
		AHU-3
0029	RED CROSS BLDG	
		AHU-1
		AHU-2
0202	PHYS FITNESS CTR	
		AHU-1
0210	MILIT PERS BLDG	
		AHU-4
		AHU-5
0211	ADMIN	
		AHU-1
		AHU-2
0214	ENL BARRACKS W/AS	
		AHU-3
		AHU-4
		AHU-5
0222	ADMIN GEN PURP	
		AHU-1
0227	ENL BARRACKS W/AS	
		AHU-3
		AHU-4
		AHU-5
0253	DRUG ABUSE CTR	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6
		AHU-7
0302	FINANCE ADMIN	
		AHU-2
0313	CIV PERS BLDG	
		AHU-1
0319	GEN INSTR BLDG	
		AHU-1
0330	DEH ADMIN	

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 15 Small Single Zone air handling unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6
0364	UEMCS HQ	
		AHU-1
0404	ENL BARRACKS W/DAS	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
0405	ADMIN GEN PURP	
		AHU-1
0512	SR ENL QTRS	
		AHU-1
0710	TAC EQUIP SHOP	
		AHU-1
0720	AF OPS BLDG	
		AHU-1
		AHU-2
		AHU-3
0722	FLIGHT SIMULATOR	
		AHU-2
		AHU-3
		AHU-4
0724	FLIGHT SIMULATOR	
		AHU-2
		CRU-1
		CRU-2
0727	MNT HANGAR COMB	
		AHU-1
		AHU-2
0741	MNT HANGAR COMB	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
0751	AC PTS & TOE ST	
		AHU-1
0817	MNT HANGAR AVUM	

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 15 Small Single Zone air handling unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		AHU-1
		AHU-2
		AHU-3
0820	TAC EQUIP SHOP	
		AHU-1
0833	AIRCRAFT HANGAR	
		AHU-1
		AHU-2
0840	VEHICLE MNT SHOP ORG	
		AHU-1
0853	MNT HANGAR AVUM	
		AHU-1
		AHU-2
		AHU-3
1470	AR VEH MNT SHOP	
		AHU-1
		AHU-2
5315	MORRIS HILL CHAPEL	
		AHU-1
5800	YOUTH CTR	
		AHU-2
6620	COMMUN ACT CTR	
		AHU-2
		AHU-4
6910	EXC SP ST FAC	
		AHU-1
		AHU-2
6914	EXC MAIN RETL	
		AHU-1
		AHU-2
6918	SKILL DEV CTR	
		AHU-1
		AHU-2
		AHU-3
		RTU-1
		RTU-2
		RTU-3
		RTU-4
		RTU-5
7017	BN HQ BLDG	
		AHU-1
7033	BN HQ BLDG	

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 15 Small Single Zone air handling unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		AHU-1
7036	REGIMENTAL HQ BLDG	AHU-1
7050	ENL BARRACKS W/AS	AHU-1
7086	UNIT CHAPEL	AHU-1
7215	BN HQ BLDG	AHU-1
7264	LIBRARY MAIN	AHU-1 AHU-2 AHU-3 AHU-4 AHU-5
7285	CLOTHING SALES	AHU-1
7305	APP INSTR BLDG	AHU-1 AHU-2 AHU-3 AHU-4
7350	VEH MNT SHOP ORG	AHU-1 AHU-2 AHU-3 AHU-4 AHU-5 AHU-6
7450	REGIMENTAL HQ BLDG	AHU-1
7500	VEH MNT SHOP ORG	AHU-1 AHU-2 AHU-3 AHU-4 AHU-5 AHU-6
7520	VEH MNT SHOP ORG	AHU-1 AHU-2 AHU-3

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 15 Small Single Zone air handling unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		AHU-4
		AHU-5
		AHU-6
7602	ADMIN & SUPPORT BLDG	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
7604	GEN INST BLDG	
		AHU-3
7608	ADMIN & SUPPORT BLDG	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
7610	ENL BARRACKS W/AS	
		AHU-1
		AHU-2
7612	ENL BARRACKS W/AS	
		AHU-1
		AHU-2
7614	ENL BARRACKS W/AS	
		AHU-1
		AHU-2
7616	ENL BARRACKS W/AS	
		AHU-1
		AHU-2
7636	REGIMENTAL HQ BLDG	
		AHU-1
7652	ADMIN & SUPPORT BLDG	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
7658	ADMIN & SUPPORT BLDG	
		AHU-1
		AHU-2
		AHU-3
		AHU-4

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 15 Small Single Zone air handling unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		AHU-5
7720	VEH MNT SHOP ORG	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6
7760	VEH MNT SHOP ORG	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6
7780	VEH MNT SHOP ORG	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6
7804	ENL PERS DIN	
		AHU-1
		AHU-2
7806	BN HQ BLDG	
		AHU-1
		AHU-2
7810	ENL BARRACKS W/O DIN	
		AHU-1
		AHU-2
7812	ENL BARRACKS W/O DIN	
		AHU-1
		AHU-2
7814	ENL BARRACKS W/O DIN	
		AHU-1
		AHU-2
7816	ENL BARRACKS W/O DIN	
		AHU-1
		AHU-2
7818	ENL BARRACKS W/O DIN	
		AHU-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 15 Small Single Zone air handling unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		AHU-2
7854	BN HQ BLDG	
		AHU-1
		AHU-2
7856	ENL PERS DIN	
		AHU-1
		AHU-2
7865	UNIT CHAPEL	
		AHU-1
7866	THEATER W/DRESS RM	
		AHU-1
		AHU-2
7900	VEH MNT SHOP ORG	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6
7920	VEH MNT SHOP DS	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6
		AHU-7
7940	VEH MNT SHOP ORG	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6
7960	VEH MNT SHOP ORG	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6
8010	DET DAY ROOM	

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 15 Small Single Zone air handling unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		AHU-1
8020	DET DAY ROOM	
		AHU-1
8044	APP INSTR BLDG	
		AHU-1
		AHU-2
8046	DET DAY ROOM	
		AHU-1
8056	DET DAY ROOM	
		AHU-1
8069	IN SW POOL/GYM	
		AHU-1
		AHU-2
8100	CONSOLIDATED MNT	
		AHU-1
		AHU-10
		AHU-11
		AHU-12
		AHU-13
		AHU-14
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-7
		AHU-9
8300	VEH MNT SHOP ORG	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6
8320	VEH MNT SHOP ORG	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6
8330	VEH MNT SHOP ORG	
		AHU-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 15 Small Single Zone air handling unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
8340	VEH MNT SHOP ORG	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6
8370	VEH MNT SHOP ORG	
		AHU-1
		AHU-2
8380	VEH MNT SHOP ORG	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6
		AHU-7
8390	TAC EQUIP SHOP	
		AHU-1
8410	VEH MNT SHOP ORG	
		AHU-1
		AHU-2
		AHU-3
		AHU-4
		AHU-5
		AHU-6
		AHU-7

I/O SUMMARY TABLE

Date Prepared:
09-Dec-95

BUILDING NUMBER: TYPICAL

SYSTEM NO.: 16 - HEATING & VENTILATING UNIT

HARDWARE – OUTPUT (DIGITAL, ANALOG) and INPUT (DIGITAL)

	OUTPUT DIGITAL: CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACT	SOLENOID		OUTPUT ANALOG: POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA		INPUT DIGITAL: PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH
GRAPHIC DISPLAY ●																				
SUPPLY FAN	●																			
OA DAMPER						●														
HEATING COIL							●													
SUPPLY AIR																				
SPACE																				
OUTSIDE AIR (COMMON)																				
TOTAL	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0

HARDWARE – INPUT (ANALOG)

	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE
GRAPHIC DISPLAY ●														
SUPPLY FAN											●			
OA DAMPER														
HEATING COIL														
SUPPLY AIR			●											
SPACE	●													
OUTSIDE AIR (COMMON)														●
TOTAL	1	0	1	0	0	0	0	0	0	0	1	0	0	1

HARDWARE – ALARM (DIG, ANA); SOFTWARE – APPLICATION PROGRAMS, DDC PROGRAMS; FAILURE MODE

	ALARM DIG: CONTACT CLOSURE		ALARM ANA: HIGH LIMIT	LOW LIMIT	RUN TIME	APPLICATION PROGRAMS: SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	DDC PROGRAMS: PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
GRAPHIC DISPLAY ●																								
SUPPLY FAN			●	●	●	●	●			●														F
OA DAMPER												●												F
HEATING COIL																					●			O
SUPPLY AIR			●	●								●												
SPACE			●	●			●			●		●												
OUTSIDE AIR (COMMON)							●			●														

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 16 Heating and Ventilating Unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0003	POST CHAPEL	
		AHU-2
0202	PHYS FITNESS CTR	
		UH-1
		UH-2
		UH-3
		UH-4
		UH-5
0710	TAC EQUIP SHOP	
		MAU-1
0723	MNT HANGAR COMB	
		HV-1
0727	MNT HANGAR COMB	
		HV-1
0810	ADMIN & SUPPLY BLDG	
		HV-1
		HV-2
		HV-3
		HV-4
0812	ADMIN & SUPPORT BLDG	
		HV-1
		HV-2
		HV-3
		HV-4
		HV-5
0817	MNT HANGAR AVUM	
		H&V-1
		H&V-2
		H&V-3
		H&V-4
		H&V-5
		H&V-6
0820	TAC EQUIP SHOP	
		HV-1
		MAU-1
		MAU-2
0833	AIRCRAFT HANGAR	
		H&V-1
		H&V-2
0840	VEHICLE MNT SHOP ORG	
		HV-1
		MAU-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 16 Heating and Ventilating Unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0853	MNT HANGAR AVUM	
		HV-1
		HV-2
		MAU-1
		MAU-2
		MAU-3
		MAU-4
1470	AR VEH MNT SHOP	
		MAU-1
5000	FIRE STATION	
		AHU-2
6620	COMMUN ACT CTR	
		AHU-3
6914	EXC MAIN RETL	
		AHU-3
6918	SKILL DEV CTR	
		MUA-1
6940	INDOOR SWIM POOL	
		HV-2
7024	GYMNASIUM	
		FC-1
		FC-2
		HV-1
		HV-2
		HV-3
		HV-4
		HV-5
7050	ENL BARRACKS W/AS	
		HV-1
7212	CO HQ BLDG	
		HV-1
		HV-2
		HV-3
		HV-4
7220	CO HQ BLDG	
		HV-1
		HV-2
		HV-3
		HV-4
7243	ADMIN & SUPPORT BLDG	
		H&V-1
7350	VEH MNT SHOP ORG	

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 16 Heating and Ventilating Unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		MAU-1
		MAU-2
		MAU-3
7432	ADMIN & SUPPORT BLDG	
		HV-1
		HV-2
		HV-3
		HV-4
		HV-5
7500	VEH MNT SHOP ORG	
		MAU-1
		MAU-2
		MAU-3
7520	VEH MNT SHOP ORG	
		MAU-1
		MAU-2
		MAU-3
7632	GYMNASIUM	
		FC-1
		FC-2
		HV-1
		HV-2
		HV-3
		HV-4
		HV-5
7720	VEH MNT SHOP ORG	
		MAU-1
		MAU-2
		MAU-3
7760	VEH MNT SHOP ORG	
		MAU-1
		MAU-2
		MAU-3
7780	VEH MNT SHOP ORG	
		MAU-1
		MAU-2
		MAU-3
7804	ENL PERS DIN	
		HV-1
		HV-2
7832	GYMNASIUM	
		FC-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 16 Heating and Ventilating Unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		FC-2
		HV-1
		HV-2
		HV-3
		HV-4
		HV-5
7856	ENL PERS DIN	
		HV-1
		HV-2
7900	VEH MNT SHOP ORG	
		MAU-1
		MAU-2
		MAU-3
7920	VEH MNT SHOP DS	
		HV-1
		HV-2
		HV-3
		HV-4
		HV-5
		MAU-1
		MAU-2
		MAU-3
		MAU-4
		MAU-5
		MAU-6
7940	VEH MNT SHOP ORG	
		MAU-1
		MAU-2
		MAU-3
7960	VEH MNT SHOP ORG	
		MAU-1
		MAU-2
		MAU-3
8021	ADMIN & SUPPORT BLDG	
		HV-1
		HV-2
		HV-3
		HV-4
		HV-5
8023	ADMIN & SUPPORT BLDG	
		HV-1
		HV-2

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 16 Heating and Ventilating Unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		HV-3
		HV-4
		HV-5
8057	ADMIN & SUPPORT BLDG	
		HV-1
		HV-2
		HV-3
		HV-4
		HV-5
8059	ADMIN & SUPPORT BLDG	
		HV-1
		HV-2
		HV-3
		HV-4
		HV-5
8063	ENL PERS DIN	
		AHU-2
8069	IN SW POOL/GYM	
		HV-1
		HV-2
		HV-3
		HV-4
8100	CONSOLIDATED MNT	
		AHU-24
		AHU-24(2)
		AHU-25
		AHU-26
		AHU-27
8300	VEH MNT SHOP ORG	
		MAU-1
		MAU-2
		MAU-3
8320	VEH MNT SHOP ORG	
		MAU-1
		MAU-2
		MAU-3
8330	VEH MNT SHOP ORG	
		HV-1
		MAU-1
		MAU-2
8340	VEH MNT SHOP ORG	
		MAU-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 16 Heating and Ventilating Unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		MAU-2
		MAU-3
8360	VEH MNT SHOP ORG	
		HV-1
		HV-2
		HV-3
		HV-4
		HV-5
		HV-6
8370	VEH MNT SHOP ORG	
		HV-1
		HV-2
		MAU-1
8380	VEH MNT SHOP ORG	
		MAU-1
		MAU-2
		MAU-3
		MAU-4
		MAU-5
		MAU-6
		MAU-7
		MAU-8
8390	TAC EQUIP SHOP	
		HV-1
		MAU-1
		MAU-2
8410	VEH MNT SHOP ORG	
		MAU-1
		MAU-2
		MAU-3
		MAU-4
		MAU-5
		MAU-6
		MAU-7
		MAU-8

I/O SUMMARY TABLE

Date Prepared:

09-Dec-95

BUILDING NUMBER: TYPICAL

SYSTEM NO.:
17 - HEATING & VENTILATING UNIT W/ RETURN FAN

HARDWARE	OUTPUT DIGITAL					OUTPUT ANALOG					INPUT DIGITAL										INPUT ANALOG													
	CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACT	SOLENOID		POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA		PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE
GRAPHIC DISPLAY ●																																		
SUPPLY FAN	●																														●			
RETURN FAN	●																														●			
OA DAMPER						●																												
HEATING COIL							●																											
SUPPLY AIR																							●											
SPACE																					●													
OUTSIDE AIR (COMMON)																																		●
TOTAL	2	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2	0	0	1

HARDWARE / SOFTWARE	ALARM DIG		ALARM ANA			SOFTWARE APPLICATION PROGRAMS														DDC PROGRAMS				
	CONTACT CLOSURE		HIGH LIMIT	LOW LIMIT	RUN TIME	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
GRAPHIC DISPLAY ●																								
SUPPLY FAN			●	●	●	●	●			●														F
RETURN FAN	●				●																			F
OA DAMPER												●												F
HEATING COIL			●	●																	●			O
SUPPLY AIR			●	●																				
SPACE			●	●			●			●														
OUTSIDE AIR (COMMON)							●			●														

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 17 Heating and Ventilating Unit with Return Fan

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
6940	INDOOR SWIM POOL	
		HRU-1
7245	ENL PERS DIN	
		HRU-1
		HRU-2
7606	ENL PERS DIN	
		HRU-1
		HRU-2
7654	ENL PERS DIN	
		HRU-1
		HRU-2
8069	IN SW POOL/GYM	
		HRU-1
		HRU-2
		HV-9
8100	CONSOLIDATED MNT	
		AHU-15
		AHU-16
		AHU-17
		AHU-18
		AHU-19
		AHU-20
		AHU-21
		AHU-22
		AHU-23

Date Prepared:

09-Dec-95

I/O SUMMARY TABLE

BUILDING NUMBER: TYPICAL

SYSTEM NO.: 18 - DUAL DUCT AHU

HARDWARE – OUTPUT (DIGITAL, ANALOG) and INPUT (DIGITAL)

	OUTPUT DIGITAL: CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACT	SOLENOID		OUTPUT ANALOG: POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA		INPUT DIGITAL: PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH
GRAPHIC DISPLAY ●																				
SUPPLY FAN	●																			
RETURN FAN	●																			
RA/OA/EA DAMPER						●														
MIN OA DAMPER				●																
COOLING COIL							●													
HEATING COIL							●													
COLD DECK																				
HOT DECK																				
RETURN AIR																				
MIXED AIR																				
SPACE 1						●														
SPACE 2						●														
SPACE 3						●														
SPACE 4						●														
SPACE 5						●														
FILTER												●								
SPACE HUMIDITY (COMMON)																				
OUTSIDE AIR (COMMON)																				
TOTAL	2	0	0	1	0	6	2	0	0	0	0	1	0	0	0	0	0	0	0	0

HARDWARE – INPUT (ANALOG) and ALARM

	INPUT ANALOG: SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE	ALARM DIG: CONTACT CLOSURE		ALARM ANA: HIGH LIMIT	LOW LIMIT	RUN TIME
GRAPHIC DISPLAY																			
SUPPLY FAN											●						●	●	●
RETURN FAN											●						●	●	●
RA/OA/EA DAMPER																			
MIN OA DAMPER																			
COOLING COIL																			
HEATING COIL																			
COLD DECK			●														●	●	
HOT DECK			●														●	●	
RETURN AIR			●														●	●	
MIXED AIR				●													●	●	
SPACE 1	●																●	●	
SPACE 2	●																●	●	
SPACE 3	●																●	●	
SPACE 4	●																●	●	
SPACE 5	●																●	●	
FILTER															●				
SPACE HUMIDITY (COMMON)						●											●	●	
OUTSIDE AIR (COMMON)														●					
TOTAL	5	0	3	1	0	1	0	0	0	0	2	0	0	1					

SOFTWARE – APPLICATION PROGRAMS, DDC PROGRAMS and FAILURE MODE

	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	DDC: PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
GRAPHIC DISPLAY																			
SUPPLY FAN	●	●		●	●														C
RETURN FAN	●	●		●	●														C
RA/OA/EA DAMPER						●	●												C
MIN OA DAMPER																			C
COOLING COIL								●								●			F
HEATING COIL								●								●			O
COLD DECK								●								●			
HOT DECK								●								●			
RETURN AIR						●													
MIXED AIR						●													
SPACE 1		●			●											●			
SPACE 2		●			●											●			
SPACE 3		●			●											●			
SPACE 4		●			●											●			
SPACE 5		●			●											●			
FILTER																			
SPACE HUMIDITY (COMMON)																			
OUTSIDE AIR (COMMON)		●			●	●													

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 18 Dual Duct air handling unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0602	DENTAL CLINIC	
		AHU-1
4010	DENTAL CLINIC	
		AHU-1
7485	BOWLING ALLEY	
		AHU-1
7670	DENTAL CLINIC	
		AHU-1

I/O SUMMARY TABLE

Date Prepared:
12-Sep-95

BUILDING NUMBER: TYPICAL

SYSTEM NO.: 19 - FAN COIL UNIT

HARDWARE – OUTPUT and INPUT (DIGITAL)

	OUTPUT DIGITAL: CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACTOR	SOLENOID		OUTPUT ANALOG: POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA		INPUT DIGITAL: PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH
GRAPHIC DISPLAY ●																				
CONTACTOR		●													●					
SPACE																				
OUTSIDE AIR (COMMON)																				
TOTAL	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

HARDWARE – INPUT (ANALOG)

	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE
GRAPHIC DISPLAY ●														
CONTACTOR														
SPACE	●													
OUTSIDE AIR (COMMON)														●
TOTAL	1	0	0	0	0	0	0	0	0	0	0	0	0	1

HARDWARE – ALARM; SOFTWARE

	ALARM DIG: CONTACT CLOSURE		ALARM ANA: HIGH LIMIT	LOW LIMIT	RUN TIME	APPLICATION PROGRAMS: SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	DDC PROGRAMS: PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
GRAPHIC DISPLAY ●																								
CONTACTOR	●				●	●	●			●														O
SPACE			●	●			●			●														
OUTSIDE AIR (COMMON)							●			●														

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 19 Fan coil unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0405	ADMIN GEN PURP	
		FC-1
		FC-2
0810	ADMIN & SUPPLY BLDG	
		FC-1
0812	ADMIN & SUPPORT BLDG	
		FC-1
5315	MORRIS HILL CHAPEL	
		FC-1
		FC-2
		FC-3
7028	BN CLASSROOMS	
		FC-1
7031	BN HQ BLDG	
		FC-1
7036	REGIMENTAL HQ BLDG	
		FC-1
		FC-2
7046	BN CLASSROOMS	
		FC-1
7047	BN HQ BLDG	
		FC-1
7048	BN HQ BLDG	
		FC-1
7086	UNIT CHAPEL	
		FC-1
7212	CO HQ BLDG	
		FC-1
7220	CO HQ BLDG	
		FC-1
7243	ADMIN & SUPPORT BLDG	
		FC-1
7432	ADMIN & SUPPORT BLDG	
		FC-1
7450	REGIMENTAL HQ BLDG	
		FC-1
7636	REGIMENTAL HQ BLDG	
		FC-1
7802	ADMIN & SUPPORT BLDG	
		FC-1
7808	ADMIN & SUPPORT BLDG	
		FC-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 19 Fan coil unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
7834	REGIMENTAL HQ BLDG	
		FC-1
7852	ADMIN & SUPPORT BLDG	
		FC-1
7858	ADMIN & SUPPORT BLDG	
		FC-1
7865	UNIT CHAPEL	
		FC-1
8021	ADMIN & SUPPORT BLDG	
		FC-1
8023	ADMIN & SUPPORT BLDG	
		FC-1
8057	ADMIN & SUPPORT BLDG	
		FC-1
8059	ADMIN & SUPPORT BLDG	
		FC-1

Date Prepared:

12-Sep-95

I/O SUMMARY TABLE

BUILDING NUMBER TYPICAL	HARDWARE																																	
	OUTPUT										INPUT																							
	DIGITAL					ANALOG					DIGITAL										ANALOG													
SYSTEM NO.: 20 - INFRARED RADIANT HEATERS	CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACTOR	SOLENOID		POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA		PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE
GRAPHIC DISPLAY ●																																		
CONTACTOR		●													●																			
SPACE																					●													
OUTSIDE AIR (COMMON)																																		●
TOTAL	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1

	HARDWARE					SOFTWARE																		
	ALARM					APPLICATION PROGRAMS														DDC PROGRAMS				
	DIG		ANA																					
	CONTACT CLOSURE		HIGH LIMIT	LOW LIMIT	RUN TIME	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
CONTACTOR	●				●	●	●			●														O
SPACE			●	●			●			●														
OUTSIDE AIR (COMMON)							●			●														

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 20 Infrared Radiant Heaters

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0840	VEHICLE MNT SHOP ORG	
		RAD-1
7350	VEH MNT SHOP ORG	
		RAD-1
		RAD-2
7500	VEH MNT SHOP ORG	
		RAD-1
		RAD-2
7520	VEH MNT SHOP ORG	
		RAD-1
		RAD-2
7720	VEH MNT SHOP ORG	
		RAD-1
		RAD-2
7760	VEH MNT SHOP ORG	
		RAD-1
		RAD-2
7780	VEH MNT SHOP ORG	
		RAD-1
		RAD-2
7900	VEH MNT SHOP ORG	
		RAD-1
		RAD-2
7920	VEH MNT SHOP DS	
		RAD-1
		RAD-2
		RAD-3
		RAD-4
		RAD-5
7940	VEH MNT SHOP ORG	
		RAD-1
		RAD-2
7960	VEH MNT SHOP ORG	
		RAD-1
		RAD-2
8300	VEH MNT SHOP ORG	
		RAD-1
		RAD-2
8320	VEH MNT SHOP ORG	
		RAD-1
		RAD-2
8340	VEH MNT SHOP ORG	

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 20 Infrared Radiant Heaters

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		RAD-1
		RAD-2
8360	VEH MNT SHOP ORG	
		RAD-1
		RAD-2
8370	VEH MNT SHOP ORG	
		RAD-1
8380	VEH MNT SHOP ORG	
		RAD-1
		RAD-2
		RAD-3
		RAD-4
8410	VEH MNT SHOP ORG	
		RAD-1
		RAD-2
		RAD-3
		RAD-4

I/O SUMMARY TABLE

Date Prepared:

12-Sep-95

BUILDING NUMBER: TYPICAL

SYSTEM NO.: 21 - HW UNIT HEATER

GRAPHIC DISPLAY ●

HARDWARE – OUTPUT / INPUT

	OUTPUT DIGITAL: CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACTOR	SOLENOID		OUTPUT ANALOG: POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA		INPUT DIGITAL: PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH	INPUT ANALOG: SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE
CONTACTOR		●													●																			
SPACE																					●													
OUTSIDE AIR (COMMON)																																		●
TOTAL	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1

HARDWARE – ALARM

	DIG: CONTACT CLOSURE		ANA: HIGH LIMIT	LOW LIMIT	RUN TIME
CONTACTOR	●				●
SPACE			●	●	
OUTSIDE AIR (COMMON)					

SOFTWARE

	APPLICATION PROGRAMS: SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	DDC PROGRAMS: PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
CONTACTOR	●	●			●														O
SPACE		●			●														
OUTSIDE AIR (COMMON)		●			●														

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 21 HW Unit heater

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0223	ENL BARRACKS W/DAS	
		UH-1
		UH-2
0302	FINANCE ADMIN	
		UH-1-4
0409	ENL BARRACKS W/AS	
		UH-1
		UH-2
0410	ENL BARRACKS W/AS	
		UH-1
		UH-2
0411	ENL BARRACKS W/AS	
		UH-1
		UH-2
0710	TAC EQUIP SHOP	
		UH-1
0723	MNT HANGAR COMB	
		UH-1
		UH-2
		UH-3
		UH-4
0727	MNT HANGAR COMB	
		UH-1
		UH-2
		UH-3
		UH-4
0751	AC PTS & TOE ST	
		UH-1
1470	AR VEH MNT SHOP	
		UH-1
		UH-2
7176	MOTOR POOL MNT SHOP	
		UH-1
7178	MOTOR POOL ADMIN	
		UH-1
		UH-2
7243	ADMIN & SUPPORT BLDG	
		UH-1
7485	BOWLING ALLEY	
		UH-1
		UH-2
7920	VEH MNT SHOP DS	

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 21 HW Unit heater

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		UH-1
8100	CONSOLIDATED MNT	
		UH-1
		UH-2
		UH-3
		UH-4
		UH-5
		UH-6
		UH-7
		UH-8
8330	VEH MNT SHOP ORG	
		UH-1
		UH-2
8390	TAC EQUIP SHOP	
		UH-1
		UH-2

Date Prepared:

12-Sep-95

I/O SUMMARY TABLE

BUILDING NUMBER: TYPICAL

SYSTEM NO.: 22 - HEAT PUMP

GRAPHIC DISPLAY ●

HARDWARE – OUTPUT

	DIGITAL: CONTROL RELAY W/H-O-A	DIGITAL: CONTROL RELAY	DIGITAL: CONTROL RELAY W/CONTACTOR	DIGITAL: SOLENOID	DIGITAL:	ANALOG: POSITION DAMPER	ANALOG: POSITION VALVE	ANALOG: POSITION DECK	ANALOG: CPA	ANALOG:
CONTACTOR		●								
SPACE										
OUTSIDE AIR (COMMON)										
TOTAL	0	1	0	0	0	0	0	0	0	0

HARDWARE – INPUT – DIGITAL

	PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH
CONTACTOR					●					
SPACE										
OUTSIDE AIR (COMMON)										
TOTAL	0	0	0	0	1	0	0	0	0	0

HARDWARE – INPUT – ANALOG

	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE
CONTACTOR														
SPACE	●													
OUTSIDE AIR (COMMON)														●
TOTAL	1	0	0	0	0	0	0	0	0	0	0	0	0	1

HARDWARE – ALARM

	DIG: CONTACT CLOSURE	DIG:	ANA: HIGH LIMIT	ANA: LOW LIMIT	ANA: RUN TIME
CONTACTOR	●				●
SPACE			●	●	
OUTSIDE AIR (COMMON)					

SOFTWARE – APPLICATION PROGRAMS

	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET
CONTACTOR	●	●			●									
SPACE		●			●									
OUTSIDE AIR (COMMON)		●			●									

SOFTWARE – DDC PROGRAMS / FAILURE MODE

	PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
CONTACTOR					O
SPACE					
OUTSIDE AIR (COMMON)					

C - LAST COMMAND

H - HIGH VALUE

L - LOW VALUE

O - ON (OPEN)

F - OFF (CLOSED)

N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 22 Heat pump unit

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0200	ADMIN GEN PURP	
		HP-1
		HP-2
		HP-3
		HP-4
		HP-5
		HP-6
0403	ADMIN GEN PURP	
		AHU-1
		AHU-2
0500	POST HQ BLDG	
		HP-1
		HP-2
		HP-3
		HP-4
		HP-5
		HP-6
0509	ADMIN GEN PURPOSE	
		HP-1

Date Prepared:
09-Dec-95

I/O SUMMARY TABLE

BUILDING NUMBER: TYPICAL

SYSTEM NO.: 23 - VENTILATION FAN

HARDWARE — OUTPUT

	DIGITAL: CONTROL RELAY W/H-O-A	DIGITAL: CONTROL RELAY	DIGITAL: CONTROL RELAY W/CONTACT	DIGITAL: SOLENOID	DIGITAL:	ANALOG: POSITION DAMPER	ANALOG: POSITION VALVE	ANALOG: POSITION DECK	ANALOG: CPA	ANALOG:
GRAPHIC DISPLAY ●										
VENTILATION FAN	●									
SPACE										
TOTAL	1	0	0	0	0	0	0	0	0	0

HARDWARE — INPUT — DIGITAL

	PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH
GRAPHIC DISPLAY ●										
VENTILATION FAN										
SPACE										
TOTAL	0	0	0	0	0	0	0	0	0	0

HARDWARE — INPUT — ANALOG

	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE
GRAPHIC DISPLAY ●														
VENTILATION FAN											●			
SPACE	●													
TOTAL	1	0	0	0	0	0	0	0	0	0	1	0	0	0

HARDWARE — ALARM / SOFTWARE

	ALARM DIG: CONTACT CLOSURE	ALARM DIG:	ALARM ANA: HIGH LIMIT	ALARM ANA: LOW LIMIT	ALARM ANA: RUN TIME	APPLICATION PROGRAMS: SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	DDC PROGRAMS: PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL	DDC PROGRAMS:	FAILURE MODE
GRAPHIC DISPLAY ●																								
VENTILATION FAN			●	●	●	●	●			●														O
SPACE			●	●			●			●														

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 23 Ventilation fan

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
7243	ADMIN & SUPPORT BLDG	
		EF-1

Date Prepared:

12-Sep-95

I/O SUMMARY TABLE

BUILDING NUMBER: TYPICAL

SYSTEM NO.: 24 - DUAL TEMPERATURE WATER PUMP

GRAPHIC DISPLAY: ●

HARDWARE – OUTPUT

	DIGITAL: CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACTOR	SOLENOID		ANALOG: POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA	
DUAL TEMP WATER PUMP	●									
DUAL TEMP WATER SUPPLY										
DUAL TEMP WATER RETURN										
SPACE TEMP 1										
SPACE TEMP 2										
TOTAL	1	0	0	0	0	0	0	0	0	0

HARDWARE – INPUT – DIGITAL

	PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH
DUAL TEMP WATER PUMP			●							
DUAL TEMP WATER SUPPLY										
DUAL TEMP WATER RETURN										
SPACE TEMP 1										
SPACE TEMP 2										
TOTAL	0	0	1	0	0	0	0	0	0	0

HARDWARE – INPUT – ANALOG

	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE
DUAL TEMP WATER PUMP														
DUAL TEMP WATER SUPPLY					●									
DUAL TEMP WATER RETURN					●									
SPACE TEMP 1	●													
SPACE TEMP 2	●													
TOTAL	2	0	0	0	2	0	0	0	0	0	0	0	0	0

HARDWARE – ALARM

	DIG: CONTACT CLOSURE		ANA: HIGH LIMIT	LOW LIMIT	RUN TIME
DUAL TEMP WATER PUMP	●				●
DUAL TEMP WATER SUPPLY			●	●	
DUAL TEMP WATER RETURN			●	●	
SPACE TEMP 1			●	●	
SPACE TEMP 2			●	●	

SOFTWARE – APPLICATION PROGRAMS

	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET
DUAL TEMP WATER PUMP	●	●		●	●									
DUAL TEMP WATER SUPPLY														
DUAL TEMP WATER RETURN														
SPACE TEMP 1		●			●									
SPACE TEMP 2		●			●									

SOFTWARE – DDC PROGRAMS

	PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
DUAL TEMP WATER PUMP					O
DUAL TEMP WATER SUPPLY					
DUAL TEMP WATER RETURN					
SPACE TEMP 1					
SPACE TEMP 2					

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 24 Dual temperature water pump

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0253	DRUG ABUSE CTR	
		DTWP-1
		DTWP-2
0405	ADMIN GEN PURP	
		DTWP-1
0540	OFF QTRS MILIT	
		DTWP-1
		DTWP-2
0541	OFF QTRS MILIT	
		DTWP-1
		DTWP-2
0542	OFF QTRS MILIT	
		DTWP-1
		DTWP-2
0610	ENL BARRACKS W/AS	
		DTWP-1
		DTWP-2
0804	RGT HQ BUILD	
		DTWP-1
0810	ADMIN & SUPPLY BLDG	
		DTWP-1
		DTWP-2
0812	ADMIN & SUPPORT BLDG	
		DTWP-1
		DTWP-2
7028	BN CLASSROOMS	
		DTWP-1
7031	BN HQ BLDG	
		DTWP-1
7046	BN CLASSROOMS	
		DTWP-1
7047	BN HQ BLDG	
		DTWP-1
7048	BN HQ BLDG	
		DTWP-1
7050	ENL BARRACKS W/AS	
		DTWP-1
		DTWP-2
7053	ENL BARRACKS W/AS	
		DTWP-1
		DTWP-2
7086	UNIT CHAPEL	

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 24 Dual temperature water pump

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		DTWP-1
		DTWP-2
7610	ENL BARRACKS W/AS	
		DTWP-1
		DTWP-2
		DTWP-3
		DTWP-4
7612	ENL BARRACKS W/AS	
		DTWP-1
		DTWP-2
		DTWP-3
		DTWP-4
7614	ENL BARRACKS W/AS	
		DTWP-1
		DTWP-2
		DTWP-3
		DTWP-4
7616	ENL BARRACKS W/AS	
		DTWP-1
		DTWP-2
		DTWP-3
		DTWP-4
7808	ADMIN & SUPPORT BLDG	
		DTWP-1
7810	ENL BARRACKS W/O DIN	
		DTWP-1
		DTWP-2
		DTWP-3
		DTWP-4
7812	ENL BARRACKS W/O DIN	
		DTWP-1
		DTWP-2
		DTWP-3
		DTWP-4
7814	ENL BARRACKS W/O DIN	
		DTWP-1
		DTWP-2
		DTWP-3
		DTWP-4
7816	ENL BARRACKS W/O DIN	
		DTWP-1
		DTWP-2

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 24 Dual temperature water pump

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
		DTWP-3
		DTWP-4
7818	ENL BARRACKS W/O DIN	
		DTWP-1
		DTWP-2
		DTWP-3
		DTWP-4
7834	REGIMENTAL HQ BLDG	
		DTWP-1
7842	ENL BARRACKS W/AS	
		DTWP-1
		DTWP-2
		DTWP-3
		DTWP-4
7844	ENL BARRACKS W/O DIN	
		DTWP-1
		DTWP-2
		DTWP-3
		DTWP-4
7846	ENL BARRACKS W/AS	
		DTWP-1
		DTWP-2
		DTWP-3
		DTWP-4
7848	ENL BARRACKS W/O DIN	
		DTWP-1
		DTWP-2
		DTWP-3
		DTWP-4
7850	ENL BARRACKS W/AS	
		DTWP-1
		DTWP-2
		DTWP-2
		DTWP-4
7852	ADMIN & SUPPORT BLDG	
		DTWP-1
7865	UNIT CHAPEL	
		DTWP-1
8002	ENL BARRACKS W/O DIN	
		DTWP-1
8006	ENL BARRACKS W/O DIN	
		DTWP-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 24 Dual temperature water pump

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
8008	ENL BARRACKS W/O DIN	DTWP-1
8012	ENL BARRACKS W/O DIN	DTWP-1
8014	ENL BARRACKS W/O DIN	DTWP-1
8021	ADMIN & SUPPORT BLDG	DTWP-1
8023	ADMIN & SUPPORT BLDG	DTWP-1
8038	ENL BARRACKS W/O DIN	DTWP-1
8040	ENL BARRACKS W/O DIN	DTWP-1
8042	ENL BARRACKS W/O DIN	DTWP-1
8048	ENL BARRACKS W/O DIN	DTWP-1
8050	ENL BARRACKS W/O DIN	DTWP-1
8052	SR ENL QTRS	DTWP-1
8054	ENL BARRACKS W/O DIN	DTWP-1
8057	ADMIN & SUPPORT BLDG	DTWP-1
8059	ADMIN & SUPPORT BLDG	DTWP-1

I/O SUMMARY TABLE

Date Prepared:
12-Sep-95

BUILDING NUMBER
TYPICAL

SYSTEM NO.:
25 - HW RADIATION PUMP

HARDWARE — OUTPUT (DIGITAL, ANALOG) and INPUT (DIGITAL)

	OUTPUT DIGITAL: CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACTOR	SOLENOID		OUTPUT ANALOG: POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA		INPUT DIGITAL: PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH
GRAPHIC DISPLAY ●																				
HW RADIATION PUMP	●												●							
SPACE																				
TOTAL	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0

HARDWARE — INPUT (ANALOG)

	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE
GRAPHIC DISPLAY														
HW RADIATION PUMP														
SPACE	●													
TOTAL	1	0	0	0	0	0	0	0	0	0	0	0	0	0

ALARM (DIG, ANA) and SOFTWARE (APPLICATION PROGRAMS, DDC PROGRAMS)

	ALARM DIG: CONTACT CLOSURE		ALARM ANA: HIGH LIMIT	LOW LIMIT	RUN TIME	APPLICATION PROGRAMS: SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	DDC PROGRAMS: PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
GRAPHIC DISPLAY																								
HW RADIATION PUMP	●				●	●	●			●														O
SPACE			●	●			●			●														

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 25 Hot water radiation pump

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0222	ADMIN GEN PURP	
		RAD-1
0301	FINANCE ADMIN	
		RAD-1
0319	GEN INSTR BLDG	
		RAD-1
0602	DENTAL CLINIC	
		RAD-1
0723	MNT HANGAR COMB	
		RAD-1
0727	MNT HANGAR COMB	
		RAD-1
0814	MEDICAL FAC - NEW	
		RAD-1
0817	MNT HANGAR AVUM	
		RAD-1
0833	AIRCRAFT HANGAR	
		RAD-1
0835	MAF OPS BLDG	
		RAD-1
0853	MNT HANGAR AVUM	
		RAD-1
4010	DENTAL CLINIC	
		RAD-1
5302	POST OFFICE	
		RAD-1
6620	COMMUN ACT CTR	
		RAD-1
7050	ENL BARRACKS W/AS	
		RAD-1
7053	ENL BARRACKS W/AS	
		RAD-1
7215	BN HQ BLDG	
		RAD-1
7243	ADMIN & SUPPORT BLDG	
		RAD-1
7404	ENL BARRACKS W/O DIN	
		RAD-1
		RAD-2
7424	ENL BARRACKS W/O DIN	
		RAD-1
		RAD-2

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 25 Hot water radiation pump

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
7602	ADMIN & SUPPORT BLDG	RAD-1
7608	ADMIN & SUPPORT BLDG	RAD-1
7610	ENL BARRACKS W/AS	RAD-1
7612	ENL BARRACKS W/AS	RAD-1
7614	ENL BARRACKS W/AS	RAD-1
7616	ENL BARRACKS W/AS	RAD-1
7636	REGIMENTAL HQ BLDG	RAD-1
7652	ADMIN & SUPPORT BLDG	RAD-1
7658	ADMIN & SUPPORT BLDG	RAD-1
7739	MVNG TRGT SIM BLDG	RAD-1
7802	ADMIN & SUPPORT BLDG	RAD-1
7806	BN HQ BLDG	RAD-1
7808	ADMIN & SUPPORT BLDG	RAD-1
7810	ENL BARRACKS W/O DIN	RAD-1
7812	ENL BARRACKS W/O DIN	RAD-1
7814	ENL BARRACKS W/O DIN	RAD-1
7816	ENL BARRACKS W/O DIN	RAD-1
7818	ENL BARRACKS W/O DIN	RAD-1
7852	ADMIN & SUPPORT BLDG	RAD-1
7854	BN HQ BLDG	RAD-1
7858	ADMIN & SUPPORT BLDG	RAD-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 25 Hot water radiation pump

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
8025	BN ADMIN & CLRM	
		RAD-1

I/O SUMMARY TABLE

Date Prepared:
12-Sep-95

BUILDING NUMBER: TYPICAL

SYSTEM NO.: 26 - PUMP

GRAPHIC DISPLAY ●

HARDWARE – OUTPUT

	DIGITAL					ANALOG				
	CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACTOR	SOLENOID		POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA	
PUMP	●									
TOTAL	1	0	0	0	0	0	0	0	0	0

HARDWARE – INPUT

	DIGITAL										ANALOG													
	PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE
PUMP			●																					
TOTAL	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

HARDWARE – ALARM / SOFTWARE

	ALARM DIG		ALARM ANA			APPLICATION PROGRAMS														DDC PROGRAMS				
	CONTACT CLOSURE		HIGH LIMIT	LOW LIMIT	RUN TIME	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
PUMP	●				●	●	●			●														O

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 26 Pump

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0003	POST CHAPEL	
		CT-1
0006	POST CHAPEL	
		CT-1
0027	OFF QTRS MILIT	
		CWP-1
		CWP-2
0200	ADMIN GEN PURP	
		CT-1
		CT-2
		HWP-1
		HWP-2
0202	PHYS FITNESS CTR	
		CT-1
0203	CAVALRY MUSEUM	
		CWP-1
0205	CAVALRY MUSEUM	
		CWP-1
		HWP-1
0207	CAVALRY MUSEUM	
		CWP-1
		HWP-1
0403	ADMIN GEN PURP	
		HWP-1
		HWP-2
		HWP-3
		HWP-4
0500	POST HQ BLDG	
		CT-1
		CT-2
0802	BN ADMIN & CLRM	
		CWP-1
		HWP-1
0808	BN ADMIN & CLRM	
		CWP-1
		HWP-1
0810	ADMIN & SUPPLY BLDG	
		CWP-1
0814	MEDICAL FAC - NEW	
		CWP-1
0817	MNT HANGAR AVUM	
		HWP-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 26 Pump

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0833	AIRCRAFT HANGAR	
		HWP-1
4010	DENTAL CLINIC	
		HWP-1
		HWP-2
5309	GUEST HOUSE	
		HWP-1
5315	MORRIS HILL CHAPEL	
		HWP-1
		HWP-2
5800	YOUTH CTR	
		HWP-1
		HWP-2
6620	COMMUN ACT CTR	
		CWP-1
6914	EXC MAIN RETL	
		HWP-1
6940	INDOOR SWIM POOL	
		HWP-1
7108	BN ADMIN & CLRM	
		CWP-1
		HWP-1
7109	BN ADMIN & CLRM	
		CWP-1
		CWP-2
		HWP-1
7212	CO HQ BLDG	
		CWP-1
		HWP-1
7220	CO HQ BLDG	
		HWP-1
		HWP-1
7243	ADMIN & SUPPORT BLDG	
		CWP-1
7245	ENL PERS DIN	
		CWP-1
7604	GEN INST BLDG	
		HWP-1
7648	ENL BARRACKS W/O DIN	
		HWP-1
		HWP-2
		HWP-3

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 26 Pump

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
7656	GEN INST BLDG	
		HWP-1
7866	THEATER W/DRESS RM	
		HWP-1
		HWP-2
8025	BN ADMIN & CLRM	
		CWP-1
8037	BN ADMIN & CLRM	
		CWP-1
		HWP-1
8063	ENL PERS DIN	
		CWP-1
8065	CLINIC W/O BEDS	
		CWP-1
8069	IN SW POOL/GYM	
		CWP-1
		CWP-2
		CWP-3
8071	RGT HQ BUILD	
		CWP-1
8100	CONSOLIDATED MNT	
		HWP-1
		HWP-2
		HWP-3
		HWP-4
		HWP-5
8330	VEH MNT SHOP ORG	
		HWP-1

I/O SUMMARY TABLE

Date Prepared:
12-Sep-95

BUILDING NUMBER: TYPICAL

SYSTEM NO.:
27 - PERIMETER RADIATION VALVE

GRAPHIC DISPLAY ●

HARDWARE – OUTPUT

	DIGITAL					ANALOG				
	CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACTOR	SOLENOID		POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA	
PERIMETER RADIATION VALVE							●			
SPACE										
TOTAL	0	0	0	0	0	0	1	0	0	0

HARDWARE – INPUT

	DIGITAL										ANALOG													
	PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE
PERIMETER RADIATION VALVE																								
SPACE											●													
TOTAL	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

HARDWARE – ALARM; SOFTWARE

	ALARM DIG		ALARM ANA			APPLICATION PROGRAMS														DDC PROGRAMS				
	CONTACT CLOSURE		HIGH LIMIT	LOW LIMIT	RUN TIME	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
PERIMETER RADIATION VALVE																					●			O
SPACE			●	●			●			●														

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 27 Perimeter radiation valve

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0211	ADMIN	
		RAD-1
		RAD-1
0214	ENL BARRACKS W/AS	
		RAD-1
0223	ENL BARRACKS W/DAS	
		RAD-1
0404	ENL BARRACKS W/DAS	
		RAD-1
0409	ENL BARRACKS W/AS	
		RAD-1
0410	ENL BARRACKS W/AS	
		RAD-1
0723	MNT HANGAR COMB	
		RAD-2
0760	BN HQ BLDG	
		RAD-1
7264	LIBRARY MAIN	
		RAD-1
7270	BN HQ BLDG	
		RAD-1
7450	REGIMENTAL HQ BLDG	
		RAD-1
8069	IN SW POOL/GYM	
		RAD-1
8390	TAC EQUIP SHOP	
		RAD-1

Date Prepared:

12-Sep-95

I/O SUMMARY TABLE

BUILDING NUMBER: TYPICAL	HARDWARE																			
	OUTPUT										INPUT									
	DIGITAL					ANALOG					DIGITAL									
SYSTEM NO.: 28 - DOMESTIC HW STORAGE TANK	CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACTOR	SOLENOID		POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA		PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH
GRAPHIC DISPLAY ●																				
STM TO HW HEAT EXCHANGER							●													
HW SUPPLY																				
HW RETURN																				
HW STORAGE TANK																				
TOTAL	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

BUILDING NUMBER: TYPICAL	HARDWARE																		
	INPUT														ALARM				
	ANALOG														DIG		ANA		
SYSTEM NO.: 28 - DOMESTIC HW STORAGE TANK	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE	CONTACT CLOSURE		HIGH LIMIT	LOW LIMIT	RUN TIME
GRAPHIC DISPLAY ●																			
STM TO HW HEAT EXCHANGER																			
HW SUPPLY					●												●	●	
HW RETURN					●												●	●	
HW STORAGE TANK					●												●	●	
TOTAL	0	0	0	0	3	0	0	0	0	0	0	0	0	0					

BUILDING NUMBER: TYPICAL	SOFTWARE																		
	APPLICATION PROGRAMS														DDC PROGRAMS				
SYSTEM NO.: 28 - DOMESTIC HW STORAGE TANK	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
GRAPHIC DISPLAY ●																			
STM TO HW HEAT EXCHANGER		●														●			O
HW SUPPLY																			
HW RETURN																			
HW STORAGE TANK																			

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 28 Domestic Hot Water Storage Tank

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
214	ENL BARRACKS W/AS	DHW-1
223	ENL BARRACKS W/DAS	DHW-1
227	ENL BARRACKS W/AS	DHW-1
402	ENL BARRACKS W/AS	DHW-1
404	ENL BARRACKS W/DAS	DHW-1
409	ENL BARRACKS W/AS	DHW-1
410	ENL BARRACKS W/AS	DHW-1
411	ENL BARRACKS W/AS	DHW-1
610	ENL BARRACKS W/AS	DHW-1
5309	GUEST HOUSE	DHW-1
7024	GYMNASIUM	DHW-1
7050	ENL BARRACKS W/AS	DHW-1
7053	ENL BARRACKS W/AS	DHW-1
7404	ENL BARRACKS W/O DIN	DHW-1 DHW-2
7424	ENL BARRACKS W/O DIN	DHW-1 DHW-2
7610	ENL BARRACKS W/AS	DHW-1 DHW-2
7612	ENL BARRACKS W/AS	DHW-1 DHW-2
7614	ENL BARRACKS W/AS	DHW-1 DHW-2
7616	ENL BARRACKS W/AS	DHW-1 DHW-2
7618	ENL BARRACKS W/O DIN	DHW-1 DHW-2

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 28 Domestic Hot Water Storage Tank

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
7632	GYMNASIUM	
		DHW-1
7642	ENL BARRACKS W/O DIN	
		DHW-1
		DHW-2
7644	ENL BARRACKS W/O DIN	
		DHW-1
		DHW-2
7646	ENL BARRACKS W/O DIN	
		DHW-1
		DHW-2
7648	ENL BARRACKS W/O DIN	
		DHW-1
		DHW-2
7650	ENL BARRACKS W/O DIN	
		DHW-1
		DHW-2
7810	ENL BARRACKS W/O DIN	
		DHW-1
		DHW-2
7812	ENL BARRACKS W/O DIN	
		DHW-1
		DHW-2
7814	ENL BARRACKS W/O DIN	
		DHW-1
		DHW-2
7816	ENL BARRACKS W/O DIN	
		DHW-1
		DHW-2
7818	ENL BARRACKS W/O DIN	
		DHW-1
		DHW-2
7842	ENL BARRACKS W/AS	
		DHW-1
		DHW-2
7844	ENL BARRACKS W/O DIN	
		DHW-1
		DHW-2
7846	ENL BARRACKS W/AS	
		DHW-1
		DHW-2
7848	ENL BARRACKS W/O DIN	
		DHW-1
		DHW-2
7850	ENL BARRACKS W/AS	
		DHW-1
		DHW-2

Date Prepared:

12-Sep-95

I/O SUMMARY TABLE

BUILDING NUMBER: TYPICAL

SYSTEM NO.: 29 - WATER LEVEL ALARM

HARDWARE — OUTPUT

	DIGITAL: CONTROL RELAY W/H-O-A	DIGITAL: CONTROL RELAY	DIGITAL: CONTROL RELAY W/CONTACT	DIGITAL: SOLENOID	DIGITAL:	ANALOG: POSITION DAMPER	ANALOG: POSITION VALVE	ANALOG: POSITION DECK	ANALOG: CPA	ANALOG:
GRAPHIC DISPLAY ●										
WATER LEVEL ALARM										
TOTAL	0	0	0	0	0	0	0	0	0	0

HARDWARE — INPUT — DIGITAL

	PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH
GRAPHIC DISPLAY ●										
WATER LEVEL ALARM								●		
TOTAL	0	0	0	0	0	0	0	1	0	0

HARDWARE — INPUT — ANALOG

	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE
GRAPHIC DISPLAY ●														
WATER LEVEL ALARM														
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0

HARDWARE — ALARM

	DIG: CONTACT CLOSURE	DIG:	ANA: HIGH LIMIT	ANA: LOW LIMIT	ANA: RUN TIME
GRAPHIC DISPLAY ●					
WATER LEVEL ALARM	●				

SOFTWARE — APPLICATION PROGRAMS

	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET
GRAPHIC DISPLAY ●														
WATER LEVEL ALARM														

SOFTWARE — DDC PROGRAMS

	PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
GRAPHIC DISPLAY ●					
WATER LEVEL ALARM					

C - LAST COMMAND　　O - ON (OPEN)

H - HIGH VALUE　　F - OFF (CLOSED)

L - LOW VALUE　　N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 29 Water Level Alarm

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
3	POST CHAPEL	WLA-1
6	POST CHAPEL	WLA-1
27	OFF QTRS MILIT	WLA-1
29	RED CROSS BLDG	WLA-1
200	ADMIN GENERAL PURP	WLA-1
203	CAVALRY MUSEUM	WLA-1
205	CAVALRY MUSEUM	WLA-1
206	THEATER W/O DRESS RM	WLA-1
207	CAVALRY MUSEUM	WLA-1
210	MILIT PERS BLDG	WLA-1
211	ADMIN	WLA-1
214	ENL BARRACKS W/DAS	WLA-1
222	ADMIN GENERAL PURP	WLA-1
223	ENL BARRACKS W/DAS	WLA-1
227	ENL BARRACKS W/AS	WLA-1
301	FINANCE ADMIN	WLA-1
302	FINANCE ADMIN	WLA-1
313	CIV PERS BLDG	WLA-1
330	PW ADMIN	WLA-1
402	ENL BARRACKS W/AS	WLA-1
403	ADMIN GENERAL (DESIGN PREP)	WLA-1
404	ENL BARRACKS W/DAS	WLA-1
405	ADMIN GENERAL PURP	WLA-1
406	CID BLDG	WLA-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 29 Water Level Alarm

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
409	ENL BARRACKS W/AS	WLA-1
410	ENL BARRACKS W/AS	WLA-1
411	ENL BARRACKS W/AS	WLA-1
500	POST HQ BLDG	WLA-1
512	SR ENL QTRS	WLA-1
602	DENTAL CLINIC	WLA-1
610	ENL BARRACKS W/AS	WLA-1
620	OFF QTRS MILIT	WLA-1
621	OFF QTRS MILIT	WLA-1
4010	DENTAL CLINIC	WLA-1
5309	GUEST HOUSE	WLA-1
5315	MORRIS HILL CHAPEL	WLA-1
6620	COMMUN ACT CTR	WLA-1
7050	ENL BARRACKS W/AS	WLA-1
7053	ENL BARRACKS W/AS	WLA-1
7086	UNIT CHAPEL	WLA-1
7245	ENL PERS DIN	WLA-1
7404	ENL BARRACKS W/O DIN	WLA-1
7424	ENL BARRACKS W/O DIN	WLA-1
7606	ENL PERS DIN	WLA-1
7610	ENL BARRACKS W/AS	WLA-1
7612	ENL BARRACKS W/AS	WLA-1
7614	ENL BARRACKS W/AS	WLA-1
7616	ENL BARRACKS W/AS	WLA-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 29 Water Level Alarm

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
7618	ENL BARRACKS W/O DIN	WLA-1
7642	ENL BARRACKS W/O DIN	WLA-1
7644	ENL BARRACKS W/O DIN	WLA-1
7646	ENL BARRACKS W/O DIN	WLA-1
7648	ENL BARRACKS W/O DIN	WLA-1
7650	ENL BARRACKS W/O DIN	WLA-1
7654	ENL PERS DIN	WLA-1
7665	DENTAL CLINIC	WLA-1
7670	DENTAL CLINIC	WLA-1
7804	ENL PERS DIN	WLA-1
7810	ENL BARRACKS W/O DIN	WLA-1
7812	ENL BARRACKS W/O DIN	WLA-1
7814	ENL BARRACKS W/O DIN	WLA-1
7816	ENL BARRACKS W/O DIN	WLA-1
7818	ENL BARRACKS W/O DIN	WLA-1
7842	ENL BARRACKS W/AS	WLA-1
7844	ENL BARRACKS W/O DIN	WLA-1
7846	ENL BARRACKS W/AS	WLA-1
7848	ENL BARRACKS W/O DIN	WLA-1
7850	ENL BARRACKS W/AS	WLA-1
7856	ENL PERS DIN	WLA-1
7865	UNIT CHAPEL	WLA-1
8069	IN SW POOL/GYM	WLA-1

I/O SUMMARY TABLE

Date Prepared:

08-Dec-95

BUILDING NUMBER TYPICAL	HARDWARE																																						SOFTWARE																		
	OUTPUT										INPUT																								ALARM					APPLICATION PROGRAMS														DDC PROGRAMS				
	DIGITAL					ANALOG					DIGITAL										ANALOG														DIG		ANA																					
SYSTEM NO.: 30 - COLD STORAGE - BLDG 650	CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACT	SOLENOID		POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA		PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE	CONTACT CLOSURE		HIGH LIMIT	LOW LIMIT	RUN TIME	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
GRAPHIC DISPLAY ●																																																										
REFRIGERATION COMPRESSOR NO. 1																															●						●	●	●																			
REFRIGERATION COMPRESSOR NO. 2																															●						●	●	●																			
REFRIGERATION COMPRESSOR NO. 3																															●						●	●	●																			
REFRIGERATION COMPRESSOR NO. 4																															●						●	●	●																			
ROOM NO. 1 - Milk and Dairy																				●	●																●	●																				
ROOM NO. 2 - Freezer																				●	●																●	●																				
ROOM NO. 9 - Egg and Ration																				●	●																●	●																				
ROOM NO. 16 - Front Issue																				●	●																●	●																				
ROOM NO. 17 - Potatoe Room																				●	●																●	●																				
ROOM NO. 18 - Fruits and Vegetables																				●	●																●	●																				
ROOM NO. 19 - Issue Freezer																				●	●																●	●																				
ROOM NO. 20 - Butter and Eggs																				●	●																●	●																				
ROOM NO. 21 - Rear Chiller Room																				●	●																●	●																				
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	9	0	0	0	0	0	0	0	0	0	4	0	0	0																								

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 30 Cold Storage - Bldg 650

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0650	COLD STOR FAC	
		CH-1 - 4

Date Prepared:

08-Dec-95

I/O SUMMARY TABLE

BUILDING NUMBER

TYPICAL

SYSTEM NO.:
31 - COLD STORAGE BLDG 652

	HARDWARE																			
	OUTPUT										INPUT									
	DIGITAL					ANALOG					DIGITAL									
	CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACT	SOLENOID		POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA		PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH
GRAPHIC DISPLAY ●																				
REFRIGERATION COMPRESSOR NO. 1																				
REFRIGERATION COMPRESSOR NO. 2																				
REFRIGERATION COMPRESSOR NO. 3																				
REFRIGERATION COMPRESSOR NO. 4																				
ROOM NO. 1 - Freezer																				●
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

	HARDWARE																		
	INPUT														ALARM				
	ANALOG														DIG		ANA		
	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE	CONTACT CLOSURE		HIGH LIMIT	LOW LIMIT	RUN TIME
GRAPHIC DISPLAY ●																			
REFRIGERATION COMPRESSOR NO. 1											●						●	●	●
REFRIGERATION COMPRESSOR NO. 2											●						●	●	●
REFRIGERATION COMPRESSOR NO. 3											●						●	●	●
REFRIGERATION COMPRESSOR NO. 4											●						●	●	●
ROOM NO. 1 - Freezer	●																●	●	
TOTAL	1	0	0	0	0	0	0	0	0		4	0	0	0					

	SOFTWARE																		
	APPLICATION PROGRAMS														DDC PROGRAMS				
	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
GRAPHIC DISPLAY ●																			
REFRIGERATION COMPRESSOR NO. 1																			
REFRIGERATION COMPRESSOR NO. 2																			
REFRIGERATION COMPRESSOR NO. 3																			
REFRIGERATION COMPRESSOR NO. 4																			
ROOM NO. 1 - Freezer																			

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 31 Cold Storage - Bldg 652

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0652	COLD STOR FAC	
		CH-1 - 4

Date Prepared:
12-Dec-95

I/O SUMMARY TABLE

BUILDING NUMBER
TYPICAL

SYSTEM NO.:
32 - PNEUMATIC CONTROL AIR

GRAPHIC DISPLAY ●

HARDWARE – OUTPUT

	DIGITAL: CONTROL RELAY W/H-O-A	DIGITAL: CONTROL RELAY	DIGITAL: CONTROL RELAY W/CONTACT	DIGITAL: SOLENOID	DIGITAL:	ANALOG: POSITION DAMPER	ANALOG: POSITION VALVE	ANALOG: POSITION DECK	ANALOG: CPA	ANALOG:
PNEUMATIC CONTROL AIR										
TOTAL	0	0	0	0	0	0	0	0	0	0

HARDWARE – INPUT

	DIGITAL: PRESSURE SWITCH	DIGITAL: DIFF. PRESS. SW. (AIR)	DIGITAL: DIFF. PRESS. SW. (WATER)	DIGITAL: CURRENT SWITCH	DIGITAL: AUXILIARY CONTACT	DIGITAL: PULSE	DIGITAL: STATUS RELAY	DIGITAL: LEVEL SWITCH	DIGITAL: TEMPERATURE SWITCH	DIGITAL: PUSH BUTTON SWITCH	ANALOG: SPACE TEMPERATURE	ANALOG: SPACE TEMPERATURE (VAV)	ANALOG: DUCT TEMPERATURE	ANALOG: AVG. TEMPERATURE	ANALOG: WATER TEMPERATURE	ANALOG: SPACE RELATIVE HUMIDITY	ANALOG: DUCT RELATIVE HUMIDITY	ANALOG: PSI/PSIG	ANALOG: FLOW	ANALOG: kW	ANALOG: AMPS	ANALOG: STACK TEMPERATURE	ANALOG: OXYGEN ANALYZER	ANALOG: OUTSIDE AIR TEMPERATURE
PNEUMATIC CONTROL AIR	●																							
TOTAL	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

HARDWARE – ALARM

	DIG: CONTACT CLOSURE	DIG:	ANA: HIGH LIMIT	ANA: LOW LIMIT	ANA: RUN TIME
PNEUMATIC CONTROL AIR	●				

SOFTWARE

	APPLICATION PROGRAMS: SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	DDC PROGRAMS: PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
PNEUMATIC CONTROL AIR																			

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 32 Pneumatic Control Air

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
203	CAVALRY MUSEUM	PCA-1
205	CAVALRY MUSEUM	PCA-1
207	CAVALRY MUSEUM	PCA-1
210	MILIT PERS BLDG	PCA-1
214	ENL BARRACKS W/DAS	PCA-1
227	ENL BARRACKS W/AS	PCA-1
253	DRUG ABUSE CTR	PCA-1
301	FINANCE ADMIN	PCA-1
302	FINANCE ADMIN	PCA-1
319	GEN INSTRUCTION BLDG	PCA-1
402	ENL BARRACKS W/AS	PCA-1
404	ENL BARRACKS W/DAS	PCA-1
405	ADMIN GENERAL PURP	PCA-1
409	ENL BARRACKS W/AS	PCA-1
410	ENL BARRACKS W/AS	PCA-1
411	ENL BARRACKS W/AS	PCA-1
512	SR ENL QTRS	PCA-1
602	DENTAL CLINIC	PCA-1
722	FLIGHT SIMULATOR	PCA-1
724	FLIGHT SIMULATOR	PCA-1
802	BN ADMIN & CLRM	PCA-1
804	RGT HQ BUILD	PCA-1
808	BN ADMIN & CLRM	PCA-1
810	ADMIN & SUPPLY BLDG	PCA-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 32 Pneumatic Control Air

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
812	ADMIN & SUPPLY BLDG	PCA-1
814	MEDICAL FAC - NEW	PCA-1
817	MNT HANGAR AVUM	PCA-1
820	TAC EQUIP SHOP	PCA-1
833	AIRCRAFT HANGAR	PCA-1
4010	DENTAL CLINIC	PCA-1
5302	POST OFFICE	PCA-1
5315	MORRIS HILL CHAPEL	PCA-1
5800	YOUTH CTR	PCA-1
6620	COMMUN ACT CTR	PCA-1
6914	EXC MAIN RETL	PCA-1
6940	INDOOR SWIM POOL	PCA-1
7024	GYMNASIUM	PCA-1
7033	BN HQ BLDG	PCA-1
7034	CLINIC W/O BEDS	PCA-1
7036	REGIMENTAL HQ BLDG	PCA-1
7050	ENL BARRACKS W/AS	PCA-1
7086	UNIT CHAPEL	PCA-1
7108	BN ADMIN & CLRM	PCA-1
7212	CO HQ BLDG	PCA-1
7220	CO HQ BLDG	PCA-1
7245	ENL PERS DIN	PCA-1
7264	LIBRARY MAIN	PCA-1
7285	CLOTHING SALES	PCA-1

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 32 Pneumatic Control Air

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
7404	ENL BARRACKS W/O DIN	PCA-1
7410	BN ADMIN & CLRM	PCA-1
7424	ENL BARRACKS W/O DIN	PCA-1
7432	ADMIN & SUPPLY BLDG	PCA-1
7450	REGIMENTAL HQ BLDG	PCA-1
7485	BOWLING ALLEY	PCA-1
7602	ENL PERS DIN	PCA-1
7604	ENL PERS DIN	PCA-1
7606	ENL PERS DIN	PCA-1
7608	ADMIN & SUPPLY BLDG	PCA-1
7610	ENL BARRACKS W/AS	PCA-1
7612	ENL BARRACKS W/AS	PCA-1
7614	ENL BARRACKS W/AS	PCA-1
7616	ENL BARRACKS W/AS	PCA-1
7618	ENL BARRACKS W/O DIN	PCA-1
7620	BN ADMIN & CLRM	PCA-1
7622	BN ADMIN & CLRM	PCA-1
7624	BN ADMIN & CLRM	PCA-1
7626	BN ADMIN & CLRM	PCA-1
7630	BN ADMIN & CLRM	PCA-1
7632	GYMNASIUM	PCA-1
7636	REGIMENTAL HQ BLDG	PCA-1
7638	BN ADMIN & CLRM	PCA-1

I/O SUMMARY TABLE

Date Prepared:
09-Dec-95

BUILDING NUMBER: TYPICAL	HARDWARE																																								SOFTWARE																		
	OUTPUT										INPUT																									ALARM					APPLICATION PROGRAMS														DDC PROGRAMS				
	DIGITAL					ANALOG					DIGITAL										ANALOG															DIG		ANA																						
SYSTEM NO.: 33 - MULTIZONE AHU with HUMIDIFICATION	CONTROL RELAY W/H-O-A	CONTROL RELAY	CONTROL RELAY W/CONTACT	SOLENOID		POSITION DAMPER	POSITION VALVE	POSITION DECK	CPA	ADJUST SPEED	PRESSURE SWITCH	DIFF. PRESS. SW. (AIR)	DIFF. PRESS. SW. (WATER)	CURRENT SWITCH	AUXILIARY CONTACT	PULSE	STATUS RELAY	LEVEL SWITCH	TEMPERATURE SWITCH	PUSH BUTTON SWITCH	SPACE TEMPERATURE	SPACE TEMPERATURE (VAV)	DUCT TEMPERATURE	AVG. TEMPERATURE	WATER TEMPERATURE	SPACE RELATIVE HUMIDITY	DUCT RELATIVE HUMIDITY	PSI/PSIG	FLOW	kW	AMPS	REMOTE SETPNT OVERRIDE	STACK TEMPERATURE	OXYGEN ANALYZER	OUTSIDE AIR TEMPERATURE	CONTACT CLOSURE		HIGH LIMIT	LOW LIMIT	RUN TIME	SCHEDULE START/STOP	OPTIMUM START/STOP	DUTY CYCLING	DEMAND LIMITING	DAY/NIGHT SETBACK	ECONOMIZER	VENTILATION/RECIRCULATION	HOT/COLD DECK RESET	REHEAT COIL RESET	HW OA RESET	CHILLED WATER RESET	CHILLER DEMAND LIMIT	AIR VOLUME CONTROL	CONDENSER WATER RESET	PROPORTIONAL CONTROL	PI CONTROL	PID CONTROL		FAILURE MODE
GRAPHIC DISPLAY ●																																																											
SUPPLY FAN	●																														●							●	●	●	●	●		●	●														C
RETURN FAN (NONE)																																																											
RA/OA/EA DAMPER						●																																								●	●												C
COOLING COIL							●																																									●								●			F
HEATING COIL							●																																									●								●			O
COLD DECK																							●															●	●																				
HOT DECK																							●															●	●																				
RETURN AIR																							●															●	●							●													
MIXED AIR																								●														●	●							●													
ZONE 1						●																																																		●			
ZONE 2						●																																																		●			
ZONE 3						●																																																		●			
ZONE 4						●																																																		●			
ZONE 5						●																																																		●			
SPACE 1																					●																	●	●			●			●			●											
SPACE 2																					●																	●	●			●			●			●											
SPACE 3																					●																	●	●			●			●			●											
SPACE 4																					●																	●	●			●			●			●											
SPACE 5																					●																	●	●			●			●			●											
FILTER												●																								●																							
HUMIDIFIER							●																			●												●	●																	●			F
OUTSIDE AIR (COMMON)																																			●							●			●	●													
TOTAL	1	0	0	0	0	6	3	0	0	0	0	1	0	0	0	0	0	0	0	0	5	0	3	1	0	1	0	0	0	0	1	0	0	0	1																								

C - LAST COMMAND
H - HIGH VALUE
L - LOW VALUE

O - ON (OPEN)
F - OFF (CLOSED)
N - LOCAL LOOP

SYSTEMS UTILIZING I/O SUMMARY TABLE

SYSTEM TYPE 33 Multizone AHU with Humidification

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG
0406	CID BLDG	
		AHU-1

APPENDIX E

COST ESTIMATES

E1
CONSTRUCTION COSTS

PROPOSED UMCS

ENGINEER'S OPINION OF PROBABLE COST

SHEET 1 OF 10

AREA	ACTIVITY	LOCATION	AMENDMENT NO.
		Ft. Riley, Kansas	

PROJECT TITLE	CONTRACT NO.
EEAP, Feasibility Study for Installation of UMCS	DACA01-94-D-0033

Line No.	Item Description	Unit of Meas.	No. of Units	MATERIAL COST Unit Cost	MATERIAL COST Total	LABOR COST Unit Cost	LABOR COST Manhrs per Unit	LABOR COST Total	EQUIPMENT COST Unit Cost	EQUIPMENT COST Total	TOTAL COST Unit Cost	TOTAL COST Total
1	**INSTALLATION OF UMCS**											
2	UMCS SOFTWARE/DATABASE	LS	1		$0			$144,580		$0		$144,580
3	UMCS CENTRAL EQUIPMENT	LS	1		$99,180			$9,828		$0		$109,008
4	TRAINING	LS	1		$0			$73,110		$0		$73,110
5	DOCUMENTATION AND SUBMITTALS	LS	1		$0			$50,000		$0		$50,000
6	TESTING	LS	1		$0			$197,908		$0		$197,908
7	TOTAL FIELD HARDWARE	LS	1		$1,452,577			$968,385		$0		$2,420,962
8	FIBER OPTIC DTM	LS	1		$326,908			$217,939		$0		$544,847
9	ACM REMOVAL	LS	1		$2,708			$11,501		$1,359		$15,567
10	RF SYSTEM FOR REMOTE SITE MONITORING	LS	1		$36,500			$13,119		$0		$49,619
11	FO DTM & EQUIP FOR UTILITY MONITORING	LS	1		$7,942			$9,426		$0		$17,368
12	SALES TAX	%	0.0		$0							$0
13	**CONSTRUCTION SUBTOTAL**				$1,925,815			$1,695,795		$1,359		$3,622,969
14	OVERHEAD	%	15.0		$288,872			$254,369		$204		$543,445
15	SUBTOTAL				$2,214,688			$1,950,164		$1,562		$4,166,414
16	BOND	%	2.5		$55,367			$48,754		$39		$104,160
17	SUBTOTAL				$2,270,055			$1,998,918		$1,601		$4,270,574
18	PROFIT	%	10.0		$227,005			$199,892		$160		$427,057
19	SUBTOTAL				$2,497,060			$2,198,810		$1,761		$4,697,632
20	CONTINGENCY	%	10.0		$249,706			$219,881		$176		$469,763
21	**GRAND TOTAL**				$2,746,766			$2,418,691		$1,938		$5,167,395
22	**SIOH COST**	%	7.0									$361,718
23	**DESIGN COST**	%	6.0									$310,044
24	**CURRENT WORKING ESTIMATE**											$5,839,156
25												
26	**1ST YR MAINT COST (8% of Field Hardwr Mat. Cost)**	%	8.0		$116,206			$0		$0		$116,206

PREPARED BY	APPROVED BY	TITLE OR ORGANIZATION	DATE
AJN	DEJ	E M C Engineers, Inc.	12/12/95

ENGINEER'S OPINION OF PROBABLE COST

SHEET 2 OF 10

AREA	ACTIVITY	LOCATION	AMENDMENT NO.
		Ft. Riley, Kansas	

PROJECT TITLE	CONTRACT NO.
EEAP, Feasibility Study for Installation of UMCS	DACA01-94-D-0033

Line No.	Item Description	Unit of Meas.	No. of Units	MATERIAL COST Unit Cost	MATERIAL COST Total	LABOR COST Unit Cost	LABOR COST Manhrs per Unit	LABOR COST Total	EQUIPMENT COST Unit Cost	EQUIPMENT COST Total	TOTAL COST Unit Cost	TOTAL COST Total
1	**ALTERNATIVE NO. 1**											
2	**UMCS SOFTWARE**											
3	OPERATING SYSTEM	LS	0	$0.00	$0	$0.00	0.0	$0	$0.00	$0	$0.00	$0
4	APPLICATION SOFTWARE	LS	0	$0.00	$0	$0.00	0.0	$0	$0.00	$0	$0.00	$0
5	COMMAND SOFTWARE	LS	0	$0.00	$0	$0.00	0.0	$0	$0.00	$0	$0.00	$0
6	**LUMP SUM TOTAL**			$16,800.00	$0	$0.00	0.0	$0	$0.00	$0	$16,800.00	$0
7												
8	**UMCS DATABASE**											
9	DATABASE GENERATION	PTS	6,680	$0.00	$0	$24.00	0.8	$120,240	$0.00	$0	$18.00	$120,240
10	GRAPHIC DISPLAY GENERATION	DIAG	42	$0.00	$0	$24.00	5.0	$5,040	$0.00	$0	$120.00	$5,040
11	GRAPHIC DISPLAY DUPLICATION	EA	965	$0.00	$0	$24.00	0.8	$19,300	$0.00	$0	$20.00	$19,300
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26	**TOTAL THIS PAGE**				$0			$144,580		$0		$144,580

PREPARED BY	APPROVED BY	TITLE OR ORGANIZATION	DATE
AJN	DEJ	E M C Engineers, Inc.	12/12/95

ENGINEER'S OPINION OF PROBABLE COST

SHEET 3 OF 10

AREA	ACTIVITY	LOCATION	AMENDMENT NO.
		Ft. Riley, Kansas	

PROJECT TITLE	CONTRACT NO.
EEAP, Feasibility Study for Installation of UMCS	DACA01-94-D-0033

Line No.	Item Description	Unit of Meas.	No. of Units	MATERIAL COST Unit Cost	MATERIAL COST Total	LABOR COST Unit Cost	LABOR COST Manhrs per Unit	LABOR COST Total	EQUIPMENT COST Unit Cost	EQUIPMENT COST Total	TOTAL COST Unit Cost	TOTAL COST Total
1	**ALTERNATIVE NO. 1**											
2	**UMCS CENTRAL EQUIPMENT**											
3	CENTRAL OPERATOR STATION	EA	1	$8,400.00	$8,400	$22.00	12	$265	$0.00	$0	$8,665.00	$8,665
4	ALARM PRINTER	EA	1	$720.00	$720	$0.00	0.0	$0	$0.00	$0	$720.00	$720
5	LOGGING PRINTER (LASER)	EA	1	$2,244.00	$2,244	$0.00	0.0	$0	$0.00	$0	$2,244.00	$2,244
6	FIBER OPTIC MODEM	EA	22	$624.00	$13,728	$0.00	0.0	$0	$0.00	$0	$624.00	$13,728
7	TELEPHONE MODEM	EA	1	$360.00	$360	$22.00	4	$98	$0.00	$0	$457.62	$458
8	PORTABLE TEST SET	EA	1	$1,800.00	$1,800	$0.00	0.0	$0	$0.00	$0	$1,800.00	$1,800
9	INSTALLATION AND TESTING	LS	1	$0.00	$0	$22.00	358	$7,875	$0.00	$0	$7,875.00	$7,875
10												
11	REMOTE WORKSTATION NO. 1	EA	1	$11,988.00	$11,988	$22.00	12	$265.00	$0.00	$0	$12,253.00	$12,253
12	REMOTE WORKSTATION NO. 2	EA	1	$11,988.00	$11,988	$22.00	12	$265.00	$0.00	$0	$12,253.00	$12,253
13	REMOTE WORKSTATION NO. 3	EA	1	$11,988.00	$11,988	$22.00	12	$265.00	$0.00	$0	$12,253.00	$12,253
14	REMOTE WORKSTATION NO. 4	EA	1	$11,988.00	$11,988	$22.00	12	$265.00	$0.00	$0	$12,253.00	$12,253
15	REMOTE WORKSTATION NO. 5	EA	1	$11,988.00	$11,988	$22.00	12	$265.00	$0.00	$0	$12,253.00	$12,253
16	REMOTE WORKSTATION NO. 6	EA	1	$11,988.00	$11,988	$22.00	12	$265.00	$0.00	$0	$12,253.00	$12,253
17												
18												
19												
20												
21												
22												
23												
24												
25												
26	**TOTAL THIS PAGE**				$99,180			$9,828		$0		$109,008

PREPARED BY	APPROVED BY	TITLE OR ORGANIZATION	DATE
AJN	DEJ	E M C Engineers, Inc.	12/12/95

ENGINEER'S OPINION OF PROBABLE COST

SHEET 4 OF 10

AREA	ACTIVITY	LOCATION	AMENDMENT NO.
		Ft. Riley, Kansas	

PROJECT TITLE: EEAP, Feasibility Study for Installation of UMCS

CONTRACT NO.: DACA01-94-D-0033

Line No.	Item Description	Unit of Meas.	No. of Units	MATERIAL COST Unit Cost	MATERIAL COST Total	LABOR COST Unit Cost	LABOR COST Manhrs per Unit	LABOR COST Total	EQUIPMENT COST Unit Cost	EQUIPMENT COST Total	TOTAL COST Unit Cost	TOTAL COST Total
1	**ALTERNATIVE NO. 1**											
2	**TRAINING**											
3	OPERATOR TRAINING 1	EA	1	$0.00	$0	$22.00	293	$6,450.00	$0.00	$0	$6,450.00	$6,450
4	OPERATOR TRAINING 2	EA	1	$0.00	$0	$22.00	288	$6,330.00	$0.00	$0	$6,330.00	$6,330
5	OPERATOR TRAINING 3	EA	1	$0.00	$0	$22.00	755	$16,610.00	$0.00	$0	$16,610.00	$16,610
6	OPERATOR TRAINING 4	EA	6	$0.00	$0	$132.00	30	$23,520.00	$0.00	$0	$3,920.00	$23,520
7	MAINTENANCE TRAINING	EA	1	$0.00	$0	$22.00	255	$5,600.00	$0.00	$0	$5,600.00	$5,600
8												
9	REVIEW SUBMITTALS	LS	1	$0.00	$0	$0.00	0	$14,600.00	$0.00	$0	$0.00	$14,600
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26	**TOTAL THIS PAGE**				$0			$73,110		$0		$73,110

PREPARED BY	APPROVED BY	TITLE OR ORGANIZATION	DATE
AJN	DEJ	E M C Engineers, Inc.	12/12/95

ENGINEER'S OPINION OF PROBABLE COST

SHEET 5 OF 10

AREA	ACTIVITY	LOCATION	AMENDMENT NO.
		Ft. Riley, Kansas	

PROJECT TITLE	CONTRACT NO.
EEAP, Feasibility Study for Installation of UMCS	DACA01-94-D-0033

				MATERIAL COST		LABOR COST			EQUIPMENT COST		TOTAL COST	
Line No.	Item Description	Unit of Meas.	No. of Units	Unit Cost	Total	Unit Cost	Manhrs per Unit	Total	Unit Cost	Total	Unit Cost	Total
1	**ALTERNATIVE NO. 1**											
2	**DOCUMENTATION AND SUBMITTALS**											
3	DOCUMENTATION	LS	1	$0.00	$0	$75.00	667	$50,000	$0.00	$0	$50,000.00	$50,000
4												
5	**TESTING**											
6	FACTORY TEST	LS	1	$0.00	$0	$22.00	455	$10,000	$0.00	$0	$10,000.00	$10,000
7	PERF. VERIFICATION TEST	LS	1	$0.00	$0	$22.00	545	$12,000	$0.00	$0	$12,000.00	$12,000
8	ENDURANCE TEST	LS	1	$0.00	$0	$22.00	455	$10,000	$0.00	$0	$10,000.00	$10,000
9	OPPOSITE SEASON TEST	LS	1	$0.00	$0	$22.00	227	$5,000	$0.00	$0	$5,000.00	$5,000
10	CONTRACTOR FIELD TEST (DIGITAL)	PNT	2,922	$0.00	$0	$22.00	0.75	$48,213	$0.00	$0	$16.50	$48,213
11	CONTRACTOR FIELD TEST (ANALOG)	PNT	6,830	$0.00	$0	$22.00	0.75	$112,695	$0.00	$0	$16.50	$112,695
12	**TOTAL TESTING**				$0			$197,908				$197,908
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26	**TOTAL THIS PAGE**				$0			$247,908		$0		$247,908

PREPARED BY	APPROVED BY	TITLE OR ORGANIZATION	DATE
AJN	DEJ	E M C Engineers, Inc.	12/12/95

ENGINEER'S OPINION OF PROBABLE COST

SHEET 6 OF 10

AREA	ACTIVITY	LOCATION	AMENDMENT NO.
		Ft. Riley, Kansas	

PROJECT TITLE	CONTRACT NO.
EEAP, Feasibility Study for Installation of UMCS	DACA01-94-D-0033

Line No.	Item Description	Unit of Meas.	No. of Units	MATERIAL COST Unit Cost	MATERIAL COST Total	LABOR COST Unit Cost	LABOR COST Manhrs per Unit	LABOR COST Total	EQUIPMENT COST Unit Cost	EQUIPMENT COST Total	TOTAL COST Unit Cost	TOTAL COST Total
1	**ALTERNATIVE NO. 1**											
2	**FIELD HARDWARE**											
3	FIELD HARDWARE FOR BLDG SYST.	LS	1	$1,452,577	$1,452,577	$22.00	44,017	$968,385	$0.00	$0	$2,420,962	$2,420,962
4	(Includes cost for field panels)											
5												
6	**FIELD HARDWARE SUBTOTAL**				$1,452,577			$968,385				$2,420,962
7												
8	**FIBER OPTIC DTM**											
9	UNDERGROUND DTM CONDUIT	LS	1	$326,908	$326,908	$22.00	9,906	$217,939	$0.00	$0	$544,847.00	$544,847
10	(134,158 LF)											
11												
12												
13												
14												
15												
16												
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21												
22												
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24												
25												
26	**TOTAL THIS PAGE**				$1,779,485			$1,186,324		$0		$2,965,809

PREPARED BY	APPROVED BY	TITLE OR ORGANIZATION	DATE
AJN	DEJ	E M C Engineers, Inc.	12/12/95

ENGINEER'S OPINION OF PROBABLE COST

AREA	ACTIVITY	LOCATION	AMENDMENT NO.
		Ft. Riley, Kansas	

PROJECT TITLE	CONTRACT NO.
EEAP, Feasibility Study for Installation of UMCS	DACA01-94-D-0033

Line No.	Item Description	Unit of Meas.	No. of Units	MATERIAL COST Unit Cost	MATERIAL COST Total	LABOR COST Unit Cost	LABOR COST Manhrs per Unit	LABOR COST Total	EQUIPMENT COST Unit Cost	EQUIPMENT COST Total	TOTAL COST Unit Cost	TOTAL COST Total
1	**ALTERNATIVE NO. 1**											
2	**ACM REMOVAL - GLOVEBAG METHOD**											
3	BUILDING 222	EA	5	$12.00	$60	$32.00	1.6	$256	$6.50	$33	$69.70	$349
4	BUILDING 610	EA	5	$12.00	$60	$32.00	1.6	$256	$6.50	$33	$69.70	$349
5	BUILDING 723	EA	7	$12.00	$84	$32.00	1.6	$358	$6.50	$46	$69.70	$488
6	BUILDING 5000	EA	4	$12.00	$48	$32.00	1.6	$205	$6.50	$26	$69.70	$279
7	BUILDING 5315	EA	7	$12.00	$84	$32.00	1.6	$358	$6.50	$46	$69.70	$488
8	BUILDING 7024	EA	8	$12.00	$96	$32.00	1.6	$410	$6.50	$52	$69.70	$558
9	BUILDING 7033	EA	3	$12.00	$36	$32.00	1.6	$154	$6.50	$20	$69.70	$209
10	BUILDING 7050	EA	2	$12.00	$24	$32.00	1.6	$102	$6.50	$13	$69.70	$139
11	BUILDING 7086	EA	3	$12.00	$36	$32.00	1.6	$154	$6.50	$20	$69.70	$209
12	BUILDING 7243	EA	2	$12.00	$24	$32.00	1.6	$102	$6.50	$13	$69.70	$139
13	BUILDING 7285	EA	4	$12.00	$48	$32.00	1.6	$205	$6.50	$26	$69.70	$279
14	BUILDING 7602 (did not qualify)	EA	0	$12.00	$0	$32.00	1.6	$0	$6.50	$0	$69.70	$0
15	BUILDING 7606	EA	6	$12.00	$72	$32.00	1.6	$307	$6.50	$39	$69.70	$418
16	BUILDING 7608 (did not qualify)	EA	0	$12.00	$0	$32.00	1.6	$0	$6.50	$0	$69.70	$0
17	BUILDING 7612	EA	8	$12.00	$96	$32.00	1.6	$410	$6.50	$52	$69.70	$558
18	BUILDING 7614	EA	8	$12.00	$96	$32.00	1.6	$410	$6.50	$52	$69.70	$558
19	BUILDING 7616	EA	8	$12.00	$96	$32.00	1.6	$410	$6.50	$52	$69.70	$558
20	BUILDING 7618	EA	3	$12.00	$36	$32.00	1.6	$154	$6.50	$20	$69.70	$209
21	BUILDING 7620	EA	3	$12.00	$36	$32.00	1.6	$154	$6.50	$20	$69.70	$209
22	BUILDING 7622	EA	5	$12.00	$60	$32.00	1.6	$256	$6.50	$33	$69.70	$349
23	BUILDING 7626	EA	3	$12.00	$36	$32.00	1.6	$154	$6.50	$20	$69.70	$209
24	BUILDING 7630	EA	3	$12.00	$36	$32.00	1.6	$154	$6.50	$20	$69.70	$209
25	BUILDING 7636	EA	4	$12.00	$48	$32.00	1.6	$205	$6.50	$26	$69.70	$279
26	**TOTAL THIS PAGE**				$1,212			$5,171		$657		$7,040

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AJN	DEJ	E M C Engineers, Inc.	12/12/95

ENGINEER'S OPINION OF PROBABLE COST

SHEET 8 OF 10

AREA	ACTIVITY	LOCATION	AMENDMENT NO.
		Ft. Riley, Kansas	

PROJECT TITLE	CONTRACT NO.
EEAP, Feasibility Study for Installation of UMCS	DACA01-94-D-0033

Line No.	Item Description	Unit of Meas.	No. of Units	MATERIAL COST Unit Cost	MATERIAL COST Total	LABOR COST Unit Cost	LABOR COST Manhrs per Unit	LABOR COST Total	EQUIPMENT COST Unit Cost	EQUIPMENT COST Total	TOTAL COST Unit Cost	TOTAL COST Total
1	**ALTERNATIVE NO. 1**											
2	**ACM REMOVAL - GLOVEBAG METHOD (cont')**											
3	BUILDING 7642	EA	3	$12.00	$36	$32.00	1.6	$154	$6.50	$20	$69.70	$209
4	BUILDING 7644	EA	3	$12.00	$36	$32.00	1.6	$154	$6.50	$20	$69.70	$209
5	BUILDING 7648	EA	5	$12.00	$60	$32.00	1.6	$256	$6.50	$33	$69.70	$349
6	BUILDING 7652 (did not qualify)	EA	0	$12.00	$0	$32.00	1.6	$0	$6.50	$0	$69.70	$0
7	BUILDING 7654	EA	4	$12.00	$48	$32.00	1.6	$205	$6.50	$26	$69.70	$279
8	BUILDING 7658	EA	6	$12.00	$72	$32.00	1.6	$307	$6.50	$39	$69.70	$418
9	BUILDING 7739	EA	4	$12.00	$48	$32.00	1.6	$205	$6.50	$26	$69.70	$279
10	BUILDING 7804	EA	7	$12.00	$84	$32.00	1.6	$358	$6.50	$46	$69.70	$488
11	BUILDING 7810	EA	8	$12.00	$96	$32.00	1.6	$410	$6.50	$52	$69.70	$558
12	BUILDING 7812	EA	8	$12.00	$96	$32.00	1.6	$410	$6.50	$52	$69.70	$558
13	BUILDING 7816	EA	8	$12.00	$96	$32.00	1.6	$410	$6.50	$52	$69.70	$558
14	BUILDING 7820	EA	3	$12.00	$36	$32.00	1.6	$154	$6.50	$20	$69.70	$209
15	BUILDING 7826	EA	3	$12.00	$36	$32.00	1.6	$154	$6.50	$20	$69.70	$209
16	BUILDING 7842	EA	8	$12.00	$96	$32.00	1.6	$410	$6.50	$52	$69.70	$558
17	BUILDING 7844	EA	8	$12.00	$96	$32.00	1.6	$410	$6.50	$52	$69.70	$558
18	BUILDING 7846	EA	8	$12.00	$96	$32.00	1.6	$410	$6.50	$52	$69.70	$558
19	BUILDING 7850	EA	8	$12.00	$96	$32.00	1.6	$410	$6.50	$52	$69.70	$558
20	BUILDING 7856	EA	6	$12.00	$72	$32.00	1.6	$307	$6.50	$39	$69.70	$418
21	BUILDING 7858	EA	3	$12.00	$36	$32.00	1.6	$154	$6.50	$20	$69.70	$209
22	BUILDING 7865	EA	5	$12.00	$60	$32.00	1.6	$256	$6.50	$33	$69.70	$349
23												
24	MOBILIZATION COSTS	EA	1	$200.00	$200	$40.00	20.0	$800	$0.00	$0	$1,000.00	$1,000
25												
26	**TOTAL THIS PAGE**				$1,496			$6,330		$702		$8,528

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AJN	DEJ	E M C Engineers, Inc.	12/12/95

ENGINEER'S OPINION OF PROBABLE COST — SHEET 9 OF 10

AREA	ACTIVITY	LOCATION	AMENDMENT NO.
		Ft. Riley, Kansas	

PROJECT TITLE	CONTRACT NO.
EEAP, Feasibility Study for Installation of UMCS	DACA01-94-D-0033

Line No.	Item Description	Unit of Meas.	No. of Units	MATERIAL COST Unit Cost	MATERIAL COST Total	LABOR COST Unit Cost	LABOR COST Manhrs per Unit	LABOR COST Total	EQUIPMENT COST Unit Cost	EQUIPMENT COST Total	TOTAL COST Unit Cost	TOTAL COST Total
1	**ALTERNATIVE NO. 1**											
2	**RADIO FREQUENCY SYSTEM FOR REMOTE SITE MONITORING**											
3	**CAMP FUNSTON**											
4	BUILDING 1470	EA	1	$4,635.00	$4,635	$22.00	79	$1,737	$0.00	$0	$6,372.00	$6,372
5	GAS METER NO. 3	EA	1	$5,085.00	$5,085	$22.00	79	$1,737	$0.00	$0	$6,822.00	$6,822
6	GAS METER NO. 4	EA	1	$5,085.00	$5,085	$22.00	79	$1,737	$0.00	$0	$6,822.00	$6,822
7												
8	**CAMP FORSYTH**											
9	ANZIO ELECTRIC SUBSTATION	EA	1	$5,085.00	$5,085	$22.00	79	$1,737	$0.00	$0	$6,822.00	$6,822
10	GAS METER NO. 5	EA	1	$5,085.00	$5,085	$22.00	79	$1,737	$0.00	$0	$6,822.00	$6,822
11	GAS METER NO. 11 (Colyer Apts.)	EA	1	$5,085.00	$5,085	$22.00	79	$1,737	$0.00	$0	$6,822.00	$6,822
12												
13	**CUSTER HILL**											
14	GAS METER NO. 9	EA	1	$5,085.00	$5,085	$22.00	79	$1,737	$0.00	$0	$6,822.00	$6,822
15												
16	**CENTRAL STATION**											
17	RF SYSTEM CONNECTION	EA	1	$1,355.00	$1,355	$22.00	44	$960	$0.00	$0	$2,315.00	$2,315
18												
19												
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23												
24												
25												
26	**TOTAL THIS PAGE**				$36,500			$13,119		$0		$49,619

PREPARED BY	APPROVED BY	TITLE OR ORGANIZATION	DATE
AJN	DEJ	E M C Engineers, Inc.	12/12/95

ENGINEER'S OPINION OF PROBABLE COST

SHEET 10 OF 10

AREA	ACTIVITY	LOCATION	AMENDMENT NO.
		Ft. Riley, Kansas	

PROJECT TITLE	CONTRACT NO.
EEAP, Feasibility Study for Installation of UMCS	DACA01-94-D-0033

				MATERIAL COST		LABOR COST			EQUIPMENT COST		TOTAL COST	
Line No.	Item Description	Unit of Meas.	No. of Units	Unit Cost	Total	Unit Cost	Manhrs per Unit	Total	Unit Cost	Total	Unit Cost	Total
1	**ALTERNATIVE NO. 1**											
2	**FO DTM AND UMCS EQUIP FOR GAS METER MONITORING**											
3	**MAIN POST AREA - FO DTM**											
4	GAS METER NO. 1	LF	200	$2.44	$487	$22.00	0.09	$383	$0.00	$0	$4.35	$870
5	GAS METER NO. 2	LF	200	$2.44	$487	$22.00	0.09	$383	$0.00	$0	$4.35	$870
6	GAS METER NO. 6	LF	150	$2.29	$343	$22.00	0.07	$3,300	$0.00	$0	$3.83	$3,643
7	GAS METER NO. 8	LF	30	$2.88	$86	$22.00	0.09	$660	$0.00	$0	$4.79	$746
8	GAS METER NO. 10	LF	50	$2.88	$144	$22.00	0.09	$1,100	$0.00	$0	$4.79	$1,244
9	GAS METER NO. 12	LF	50	$2.88	$144	$22.00	0.09	$1,100	$0.00	$0	$4.79	$1,244
10												
11	**MAIN POST AREA - UMCS EQUIPMENT (ACUs and Connection to Utility)**											
12	GAS METER NO. 1	EA	0.5	$1,250.00	$625	$22.00	23	$250	$0.00	$0	$1,750.00	$875
13	GAS METER NO. 2	EA	0.5	$1,250.00	$625	$22.00	23	$250	$0.00	$0	$1,750.00	$875
14	GAS METER NO. 6	EA	1.0	$1,250.00	$1,250	$22.00	23	$500	$0.00	$0	$1,750.00	$1,750
15	GAS METER NO. 8	EA	1.0	$1,250.00	$1,250	$22.00	23	$500	$0.00	$0	$1,750.00	$1,750
16	GAS METER NO. 10	EA	1.0	$1,250.00	$1,250	$22.00	23	$500	$0.00	$0	$1,750.00	$1,750
17	GAS METER NO. 12	EA	1.0	$1,250.00	$1,250	$22.00	23	$500	$0.00	$0	$1,750.00	$1,750
18												
19												
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24												
25												
26	**TOTAL THIS PAGE**				$7,942			$9,426		$0		$17,368

PREPARED BY	APPROVED BY	TITLE OR ORGANIZATION	DATE
AJN	DEJ	E M C Engineers, Inc.	12/12/95

E2
UNDERGROUND FIBER OPTIC DTM COST

UNDERGROUND FIBER OPTIC DTM COST

BLDG NO.	BLDG NAME	AREA (SQ. FT.)	DISTANCE OF FIBER (FT.)	ROUTING METHOD	COST / FOOT	ROUTING COST	AREA LINKING (FT.)	LINKING COST / FOOT	LINKING COST	TOTAL COST
3	POST CHAPEL	8,828	875	NEW	$4.80	$4,200				$4,200
6	POST CHAPEL	6,230	875	NEW	$4.80	$4,200				$4,200
29	RED CROSS BLDG	3,000	425	NEW	$4.80	$2,040				$2,040
200	ADMIN GENERAL PURP	60,690	500	PULL	$3.32	$1,660				$1,660
202	PHYS FITNESS CTR	51,307	530	NEW	$4.80	$2,544				$2,544
203	CAVALRY MUSEUM	5,800	530	NEW	$4.80	$2,544				$2,544
205	CAVALRY MUSEUM	16,496	530	NEW	$4.80	$2,544				$2,544
206	THEATER W/O DRESS RM	10,754	530	NEW	$4.80	$2,544				$2,544
207	CAVALRY MUSEUM	8,278	530	NEW	$4.80	$2,544				$2,544
210	MILIT PERS BLDG	58,448	450	PULL	$3.32	$1,494				$1,494
211	ADMIN	41,062	350	PULL	$3.32	$1,162				$1,162
214	ENL BARRACKS W/AS	35,821	317	NEW	$4.80	$1,522				$1,522
222	ADMIN GEN PURP	18,854	1400	PULL	$3.32	$4,648				$4,648
223	ENL BARRACKS W/DAS	47,794	317	NEW	$4.80	$1,522				$1,522
227	ENL BARRACKS W/AS	32,303	317	NEW	$4.80	$1,522				$1,522
253	DRUG ABUSE CTR	11,122	650	PULL	$3.32	$2,158				$2,158
301	FINANCE ADMIN	32,947	450	PULL	$3.32	$1,494				$1,494
302	FINANCE ADMIN	16,138	450	PULL	$3.32	$1,494				$1,494
313	CIV PERS BLDG	6,222	1400	NEW	$4.80	$6,720				$6,720
319	GEN INSTRUCTION BLDG	9,690	1400	NEW	$4.80	$6,720				$6,720
330	DEH ADMIN	14,913	600	PULL	$3.32	$1,992				$1,992
364	UEMCS HQ	744	600	PULL	$3.32	$1,992				$1,992
402	ENL BARRACKS W/AS	35,718	580	NEW	$4.80	$2,784				$2,784
403	ADMIN GENERAL PURP	18,151	580	NEW	$4.80	$2,784				$2,784
404	ENL BARRACKS W/DAS	35,718	580	NEW	$4.80	$2,784				$2,784
405	ADMIN GEN PURP	10,778	580	PULL	$3.32	$1,926				$1,926
406	CID BLDG	10,390	580	NEW	$4.80	$2,784				$2,784
409	ENL BARRACKS W/AS	32,883	580	NEW	$4.80	$2,784				$2,784
410	ENL BARRACKS W/AS	32,883	580	NEW	$4.80	$2,784				$2,784
411	ENL BARRACKS W/AS	32,883	580	NEW	$4.80	$2,784				$2,784
500	POST HQ BLDG	65,453	1450	PULL	$3.32	$4,814				$4,814
509	ADM GEN PURPOSE	10,108	1450	PULL	$3.32	$4,814				$4,814
512	SR ENL QTRS	13,619	600	NEW	$4.80	$2,880				$2,880
540	OFF QTRS MILIT	14,528	767	NEW	$4.80	$3,682				$3,682
541	OFF QTRS MILIT	18,083	767	NEW	$4.80	$3,682				$3,682
542	OFF QTRS MILIT	14,528	767	NEW	$4.80	$3,682				$3,682
602	DENTAL CLINIC	11,557	634	NEW	$4.80	$3,043	150	$4.80	$720	$3,763
610	ENL BARRACKS W/AS	29,004	634	NEW	$4.80	$3,043	150	$4.80	$720	$3,763
650	COLD STOR FAC	22,331	634	NEW	$4.80	$3,043	150	$4.80	$720	$3,763
652	COLD STOR FAC	8,167	634	NEW	$4.80	$3,043	150	$4.80	$720	$3,763
710	TAC EQUIP SHOP	2,173	510	NEW	$4.80	$2,448	529	$3.32	$1,755	$4,203
720	AF OPS BLDG	3,705	510	NEW	$4.80	$2,448	529	$3.32	$1,755	$4,203
722	FLIGHT SIMULATOR	7,000	510	NEW	$4.80	$2,448	529	$3.32	$1,755	$4,203
723	MNT HANGAR COMB	21,640	510	NEW	$4.80	$2,448	529	$3.32	$1,755	$4,203

UNDERGROUND FIBER OPTIC DTM COST

BLDG NO.	BLDG NAME	AREA (SQ. FT.)	DISTANCE OF FIBER (FT.)	ROUTING METHOD	COST / FOOT	ROUTING COST	AREA LINKING (FT.)	LINKING COST / FOOT	LINKING COST	TOTAL COST
724	FLIGHT SIMULATOR	13,188	510	NEW	$4.80	$2,448	529	$3.32	$1,755	$4,203
727	MNT HANGAR COMB	36,152	510	NEW	$4.80	$2,448	529	$3.32	$1,755	$4,203
741	MNT HANGAR COMB	38,898	510	NEW	$4.80	$2,448	529	$3.32	$1,755	$4,203
751	AC PTS & TOE ST	9,834	510	NEW	$4.80	$2,448	529	$3.32	$1,755	$4,203
802	BN ADMIN & CLRM	12,526	425	NEW	$4.80	$2,040	529	$3.32	$1,755	$3,795
804	RGT HQ BUILD	10,241	425	NEW	$4.80	$2,040	529	$3.32	$1,755	$3,795
806	COMB AC-HTG PLANT	1,000	425	NEW	$4.80	$2,040	529	$3.32	$1,755	$3,795
808	BN ADMIN & CLRM	12,526	425	NEW	$4.80	$2,040	529	$3.32	$1,755	$3,795
810	ADMIN & SUPPLY BLDG	15,152	425	NEW	$4.80	$2,040	529	$3.32	$1,755	$3,795
812	ADMIN & SUPPLY BLDG	23,559	425	NEW	$4.80	$2,040	529	$3.32	$1,755	$3,795
814	MEDICAL FAC - NEW	9,220	425	NEW	$4.80	$2,040	529	$3.32	$1,755	$3,795
817	MNT HANGAR AVUM	40,061	745	NEW	$4.80	$3,576	529	$3.32	$1,755	$5,331
820	TAC EQUIP SHOP	20,564	745	NEW	$4.80	$3,576	529	$3.32	$1,755	$5,331
833	AIRCRAFT HANGAR	52,080	740	NEW	$4.80	$3,552	529	$3.32	$1,755	$5,307
835	MAF OPS BLDG	19,470	740	NEW	$4.80	$3,552	529	$3.32	$1,755	$5,307
840	VEHICLE MNT SHOP ORG	9,152	745	NEW	$4.80	$3,576	529	$3.32	$1,755	$5,331
853	MNT HANGAR AVUM	48,112	745	NEW	$4.80	$3,576	529	$3.32	$1,755	$5,331
1470	AR VEH MNT SHOP	21,667	(INSTALL RF SYSTEM)							$0
4010	DENTAL CLINIC	15,587	500	PULL	$3.32	$1,660	135	$3.32	$448	$2,108
5000	FIRE STATION	8,400	400	PULL	$3.32	$1,328	135	$3.32	$448	$1,776
5302	POST OFFICE	12,240	550	PULL	$3.32	$1,826	135	$3.32	$448	$2,274
5309	GUEST HOUSE	23,784	550	PULL	$3.32	$1,826	135	$3.32	$448	$2,274
5315	MORRIS HILL CHAPEL	19,748	800	NEW	$4.80	$3,840	135	$3.32	$448	$4,288
5800	YOUTH CTR	21,560	600	PULL	$3.32	$1,992	135	$3.32	$448	$2,440
6620	COMMUN ACT CTR	31,740	750	PULL	$3.32	$2,490	135	$3.32	$448	$2,938
6910	EXC SP ST FAC	2,525	400	NEW	$4.80	$1,920	135	$3.32	$448	$2,368
6914	EXC MAIN RETL	63,930	500	NEW	$4.80	$2,400	135	$3.32	$448	$2,848
6918	SKILL DEV CTR	11,507	500	PULL	$3.32	$1,660	135	$3.32	$448	$2,108
6940	INDOOR SWIM POOL	23,347	500	PULL	$3.32	$1,660	135	$3.32	$448	$2,108
7017	BN HQ BLDG	2,604	400	NEW	$4.80	$1,920	135	$3.32	$448	$2,368
7024	GYMNASIUM	20,619	400	NEW	$4.80	$1,920	135	$3.32	$448	$2,368
7028	BN CLASSROOMS	3,733	318	PULL	$3.32	$1,056	135	$3.32	$448	$1,504
7031	BN HQ BLDG	3,733	318	PULL	$3.32	$1,056	135	$3.32	$448	$1,504
7033	BN HQ BLDG	4,083	318	PULL	$3.32	$1,056	135	$3.32	$448	$1,504
7034	CLINIC W/O BEDS	3,842	318	PULL	$3.32	$1,056	135	$3.32	$448	$1,504
7036	REGIMENTAL HQ BLDG	10,010	318	PULL	$3.32	$1,056	135	$3.32	$448	$1,504
7046	BN CLASSROOMS	3,733	490	PULL	$3.32	$1,627	135	$3.32	$448	$2,075
7047	BN HQ BLDG	3,733	490	PULL	$3.32	$1,627	135	$3.32	$448	$2,075
7048	BN HQ BLDG	2,604	490	PULL	$3.32	$1,627	135	$3.32	$448	$2,075
7050	ENL BARRACKS W/AS	39,675	375	NEW	$4.80	$1,800	135	$3.32	$448	$2,248
7053	ENL BARRACKS W/AS	39,675	375	NEW	$4.80	$1,800	135	$3.32	$448	$2,248
7086	UNIT CHAPEL	8,696	250	NEW	$4.80	$1,200	135	$3.32	$448	$1,648
7108	BN ADMIN & CLRM	12,527	500	PULL	$3.32	$1,660	135	$3.32	$448	$2,108
7109	BN ADMIN & CLRM	13,535	500	PULL	$3.32	$1,660	135	$3.32	$448	$2,108

UNDERGROUND FIBER OPTIC DTM COST

BLDG NO.	BLDG NAME	AREA (SQ. FT.)	DISTANCE OF FIBER (FT.)	ROUTING METHOD	COST / FOOT	ROUTING COST	AREA LINKING (FT.)	LINKING COST / FOOT	LINKING COST	TOTAL COST
7210	CH CHILLER PLANT	4,320	150	NEW	$4.80	$720	135	$3.32	$448	$1,168
7212	CO HQ BLDG	19,320	490	PULL	$3.32	$1,627	135	$3.32	$448	$2,075
7215	BN HQ BLDG	2,604	250	NEW	$4.80	$1,200	135	$3.32	$448	$1,648
7218	BN HQ BLDG	12,625	490	PULL	$3.32	$1,627	135	$3.32	$448	$2,075
7220	CO HQ BLDG	18,870	490	PULL	$3.32	$1,627	135	$3.32	$448	$2,075
7243	ADMIN & SUPPLY BLDG	17,829	370	PULL	$3.32	$1,228	135	$3.32	$448	$1,676
7245	ENL PERS DIN	13,998	385	NEW	$4.80	$1,848	135	$3.32	$448	$2,296
7264	LIBRARY MAIN	31,240	490	PULL	$3.32	$1,627	135	$3.32	$448	$2,075
7270	BN HQ BLDG	6,130	370	PULL	$3.32	$1,228	135	$3.32	$448	$1,676
7285	CLOTHING SALES	17,042	600	NEW	$4.80	$2,880	135	$3.32	$448	$3,328
7305	APP INSTR BLDG	9,872	490	PULL	$3.32	$1,627	135	$3.32	$448	$2,075
7350	VEH MNT SHOP ORG	21,345	866	NEW	$4.80	$4,157	135	$3.32	$448	$4,605
7404	ENL BARRACKS W/O DIN	50,967	385	NEW	$4.80	$1,848	135	$3.32	$448	$2,296
7410	BN ADMIN & CLRM	12,599	370	PULL	$3.32	$1,228	135	$3.32	$448	$1,676
7424	ENL BARRACKS W/O DIN	50,967	385	NEW	$4.80	$1,848	135	$3.32	$448	$2,296
7432	ADMIN & SUPPLY BLDG	13,500	490	PULL	$3.32	$1,627	135	$3.32	$448	$2,075
7450	REGIMENTAL HQ BLDG	9,850	370	PULL	$3.32	$1,228	135	$3.32	$448	$1,676
7485	BOWLING ALLEY	36,966	183	NEW	$4.80	$878	135	$3.32	$448	$1,326
7500	VEH MNT SHOP ORG	22,325	866	NEW	$4.80	$4,157	135	$3.32	$448	$4,605
7520	VEH MNT SHOP ORG	27,112	866	NEW	$4.80	$4,157	135	$3.32	$448	$4,605
7602	ADMIN & SUPPLY BLDG	13,520	361	NEW	$4.80	$1,733	135	$3.32	$448	$2,181
7604	GEN INST BLDG	13,493	490	PULL	$3.32	$1,627	135	$3.32	$448	$2,075
7608	ADMIN & SUPPLY BLDG	13,520	490	PULL	$3.32	$1,627	135	$3.32	$448	$2,075
7610	ENL BARRACKS W/AS	41,892	361	NEW	$4.80	$1,733	135	$3.32	$448	$2,181
7612	ENL BARRACKS W/AS	41,892	361	NEW	$4.80	$1,733	135	$3.32	$448	$2,181
7614	ENL BARRACKS W/AS	41,892	361	NEW	$4.80	$1,733	135	$3.32	$448	$2,181
7616	ENL BARRACKS W/AS	41,892	361	NEW	$4.80	$1,733	135	$3.32	$448	$2,181
7618	ENL BARRACKS W/O DIN	41,892	361	NEW	$4.80	$1,733	135	$3.32	$448	$2,181
7620	BN ADMIN & CLRM	6,340	280	PULL	$3.32	$930	135	$3.32	$448	$1,378
7622	BN ADMIN & CLRM	12,380	280	PULL	$3.32	$930	135	$3.32	$448	$1,378
7624	BN ADMIN & CLRM	6,158	280	PULL	$3.32	$930	135	$3.32	$448	$1,378
7626	CLINIC W/O BEDS	3,604	280	PULL	$3.32	$930	135	$3.32	$448	$1,378
7630	BN ADMIN & CLRM	6,158	280	PULL	$3.32	$930	135	$3.32	$448	$1,378
7632	GYMNASIUM	20,694	550	NEW	$4.80	$2,640	135	$3.32	$448	$3,088
7636	REGIMENTAL HQ BLDG	9,850	280	PULL	$3.32	$930	135	$3.32	$448	$1,378
7638	BN ADMIN & CLRM	6,158	280	PULL	$3.32	$930	135	$3.32	$448	$1,378
7642	ENL BARRACKS W/O DIN	41,892	310	NEW	$4.80	$1,488	135	$3.32	$448	$1,936
7644	ENL BARRACKS W/O DIN	41,892	310	NEW	$4.80	$1,488	135	$3.32	$448	$1,936
7646	ENL BARRACKS W/O DIN	41,892	310	NEW	$4.80	$1,488	135	$3.32	$448	$1,936
7648	ENL BARRACKS W/O DIN	41,892	310	NEW	$4.80	$1,488	135	$3.32	$448	$1,936
7650	ENL BARRACKS W/O DIN	41,892	310	NEW	$4.80	$1,488	135	$3.32	$448	$1,936
7652	ADMIN & SUPPLY BLDG	13,520	385	PULL	$3.32	$1,278	135	$3.32	$448	$1,726
7654	ENL PERS DIN	13,493	310	NEW	$4.80	$1,488	135	$3.32	$448	$1,936
7656	GEN INST BLDG	13,493	385	PULL	$3.32	$1,278	135	$3.32	$448	$1,726

UNDERGROUND FIBER OPTIC DTM COST

BLDG NO.	BLDG NAME	AREA (SQ. FT.)	DISTANCE OF FIBER (FT.)	ROUTING METHOD	COST / FOOT	ROUTING COST	AREA LINKING (FT.)	LINKING COST / FOOT	LINKING COST	TOTAL COST
7658	ADMIN & SUPPLY BLDG	13,520	385	PULL	$3.32	$1,278	135	$3.32	$448	$1,726
7665	DENTAL CLINIC	11,076	490	PULL	$3.32	$1,627	135	$3.32	$448	$2,075
7670	DENTAL CLINIC	14,960	490	PULL	$3.32	$1,627	135	$3.32	$448	$2,075
7720	VEH MNT SHOP ORG	22,325	775	NEW	$4.80	$3,720	135	$3.32	$448	$4,168
7739	MOVING TARGET SIM BLDG	4,074	775	NEW	$4.80	$3,720	135	$3.32	$448	$4,168
7760	VEH MNT SHOP ORG	17,163	850	NEW	$4.80	$4,080	135	$3.32	$448	$4,528
7780	VEH MNT SHOP ORG	17,163	850	NEW	$4.80	$4,080	135	$3.32	$448	$4,528
7802	ADMIN & SUPPLY BLDG	13,280	245	NEW	$4.80	$1,176	135	$3.32	$448	$1,624
7804	ENL PERS DIN	13,493	245	NEW	$4.80	$1,176	135	$3.32	$448	$1,624
7806	BN HQ BLDG	13,493	375	PULL	$3.32	$1,245	135	$3.32	$448	$1,693
7808	ADMIN & SUPPLY BLDG	13,280	375	PULL	$3.32	$1,245	135	$3.32	$448	$1,693
7810	ENL BARRACKS W/O DIN	41,843	245	NEW	$4.80	$1,176	135	$3.32	$448	$1,624
7812	ENL BARRACKS W/O DIN	41,843	370	NEW	$4.80	$1,776	135	$3.32	$448	$2,224
7814	ENL BARRACKS W/O DIN	41,843	370	NEW	$4.80	$1,776	135	$3.32	$448	$2,224
7816	ENL BARRACKS W/O DIN	41,843	370	NEW	$4.80	$1,776	135	$3.32	$448	$2,224
7818	ENL BARRACKS W/O DIN	41,843	370	NEW	$4.80	$1,776	135	$3.32	$448	$2,224
7820	BN ADMIN & CLRM	6,673	458	PULL	$3.32	$1,521	135	$3.32	$448	$1,969
7824	BN ADMIN & CLRM	12,246	458	PULL	$3.32	$1,521	135	$3.32	$448	$1,969
7826	CLINIC W/O BEDS	3,841	360	NEW	$4.80	$1,728	135	$3.32	$448	$2,176
7832	GYMNASIUM	20,694	360	NEW	$4.80	$1,728	135	$3.32	$448	$2,176
7834	REGIMENTAL HQ BLDG	9,904	458	PULL	$3.32	$1,521	135	$3.32	$448	$1,969
7836	BN ADMIN & CLRM	12,246	458	PULL	$3.32	$1,521	135	$3.32	$448	$1,969
7842	ENL BARRACKS W/AS	41,843	350	NEW	$4.80	$1,680	135	$3.32	$448	$2,128
7844	ENL BARRACKS W/O DIN	41,843	350	NEW	$4.80	$1,680	135	$3.32	$448	$2,128
7846	ENL BARRACKS W/AS	41,843	350	NEW	$4.80	$1,680	135	$3.32	$448	$2,128
7848	ENL BARRACKS W/O DIN	41,843	350	NEW	$4.80	$1,680	135	$3.32	$448	$2,128
7850	ENL BARRACKS W/AS	41,843	350	NEW	$4.80	$1,680	135	$3.32	$448	$2,128
7852	ADMIN & SUPPLY BLDG	13,280	350	NEW	$4.80	$1,680	135	$3.32	$448	$2,128
7854	BN HQ BLDG	13,493	335	PULL	$3.32	$1,112	135	$3.32	$448	$1,560
7856	ENL PERS DIN	13,493	335	NEW	$4.80	$1,608	135	$3.32	$448	$2,056
7858	ADMIN & SUPPLY BLDG	13,280	335	PULL	$3.32	$1,112	135	$3.32	$448	$1,560
7865	UNIT CHAPEL	8,718	370	NEW	$4.80	$1,776	135	$3.32	$448	$2,224
7866	THEATER W/DRESS RM	11,098	360	NEW	$4.80	$1,728	135	$3.32	$448	$2,176
7900	VEH MNT SHOP ORG	20,943	700	NEW	$4.80	$3,360	135	$3.32	$448	$3,808
7920	VEH MNT SHOP DS	124,553	800	PULL	$3.32	$2,656	135	$3.32	$448	$3,104
7940	VEH MNT SHOP ORG	22,405	1070	NEW	$4.80	$5,136	135	$3.32	$448	$5,584
7960	VEH MNT SHOP ORG	20,245	1070	NEW	$4.80	$5,136	135	$3.32	$448	$5,584
8010	DET DAY ROOM	2,100	222	NEW	$4.80	$1,066	135	$3.32	$448	$1,514
8020	DET DAY ROOM	2,100	222	NEW	$4.80	$1,066	135	$3.32	$448	$1,514
8021	ADMIN & SUPPLY BLDG	23,676	470	PULL	$3.32	$1,560	135	$3.32	$448	$2,008
8023	ADMIN & SUPPLY BLDG	23,676	470	PULL	$3.32	$1,560	135	$3.32	$448	$2,008
8025	BN ADMIN & CLRM	12,000	470	PULL	$3.32	$1,560	135	$3.32	$448	$2,008
8037	BN ADMIN & CLRM	12,000	375	PULL	$3.32	$1,245	135	$3.32	$448	$1,693
8044	APP INSTR BLDG	2,470	375	PULL	$3.32	$1,245	135	$3.32	$448	$1,693

UNDERGROUND FIBER OPTIC DTM COST

BLDG NO.	BLDG NAME	AREA (SQ. FT.)	DISTANCE OF FIBER (FT.)	ROUTING METHOD	COST / FOOT	ROUTING COST	AREA LINKING (FT.)	LINKING COST / FOOT	LINKING COST	TOTAL COST
8046	DET DAY ROOM	2,100	220	NEW	$4.80	$1,056	135	$3.32	$448	$1,504
8056	DET DAY ROOM	2,100	220	NEW	$4.80	$1,056	135	$3.32	$448	$1,504
8057	ADMIN & SUPPLY BLDG	23,676	375	PULL	$3.32	$1,245	135	$3.32	$448	$1,693
8059	ADMIN & SUPPLY BLDG	23,676	375	PULL	$3.32	$1,245	135	$3.32	$448	$1,693
8063	ENL PERS DIN	18,313	400	NEW	$4.80	$1,920	135	$3.32	$448	$2,368
8065	CLINIC W/O BEDS	3,848	670	PULL	$3.32	$2,224	135	$3.32	$448	$2,672
8071	RGT HQ BUILD	9,963	375	PULL	$3.32	$1,245	135	$3.32	$448	$1,693
8073	CH ENERGY PLANT	4,070	220	NEW	$4.80	$1,056	135	$3.32	$448	$1,504
8100	CONSOLIDATED MNT	224,927	1075	PULL	$3.32	$3,569	135	$3.32	$448	$4,017
8300	VEH MNT SHOP ORG	20,240	1070	NEW	$4.80	$5,136	135	$3.32	$448	$5,584
8320	VEH MNT SHOP ORG	20,240	1070	NEW	$4.80	$5,136	135	$3.32	$448	$5,584
8330	VEH MNT SHOP ORG	39,256	1070	NEW	$4.80	$5,136	135	$3.32	$448	$5,584
8340	VEH MNT SHOP ORG	20,240	1070	NEW	$4.80	$5,136	135	$3.32	$448	$5,584
8360	VEH MNT SHOP ORG	39,428	1070	NEW	$4.80	$5,136	135	$3.32	$448	$5,584
8370	VEH MNT SHOP ORG	26,876	1070	NEW	$4.80	$5,136	135	$3.32	$448	$5,584
8380	VEH MNT SHOP ORG	73,400	1900	NEW	$4.80	$9,120	135	$3.32	$448	$9,568
8390	TAC EQUIP SHOP	24,755	866	NEW	$4.80	$4,157	135	$3.32	$448	$4,605
8410	VEH MNT SHOP ORG	73,233	1600	PULL	$3.32	$5,312	135	$3.32	$448	$5,760
7606	ENL PERS DIN	13,493	361	NEW	$4.80	$1,733	270	$3.32	$896	$2,629
8069	IN SW POOL/GYM	25,620	750	NEW	$4.80	$3,600	270	$3.32	$896	$4,496
		4,386,940	104,108			$444,193	30,050		$100,654	$544,847

E3
DEMAND LIMIT COST ANALYSIS

DEMAND LIMITING ANALYSIS - COST SAVINGS FOR kW REDUCTION FOR INSTALLATION OF UMCS

SUMMER PEAK (KW) = 27812	1993 JUL BILL 7/1-8/2 ACTUAL	1993 AUG BILL 8/2-9/1 ACTUAL	1993 SEP BILL 9/3-10/1 ACTUAL	1993 OCT BILL 10/1-11/1 ACTUAL	1993 NOV BILL 11/1-12/1 ACTUAL	1993 DEC BILL 12/1-1/3 ACTUAL	1993 JAN BILL 1/4-2/1 ACTUAL	1993 FEB BILL 2/1-3/1 ACTUAL	1993 MAR BILL 3/3-4/1 ACTUAL	1993 APR BILL 4/1-5/3 ACTUAL	1993 MAY BILL 5/3-6/1 ACTUAL	1993 JUN BILL 6/1-7/1 ACTUAL
BASE CASE												
CAPACITY (KW)	32472	34452	26136	20754	26400	22752	27108	25812	23310	21834	21996	30096
POWER FACTOR (%)	99.20%	99.10%	99.10%	99.90%	99.80%	99.70%	99.50%	99.60%	99.60%	99.80%	99.60%	98.80%
CAPACITY (KVA)	32734	34765	26373	20775	26453	22820	27244	25916	23404	21878	22084	30462
80% SUMMER PEAK (KVA)	27812	27812	27812	27812	27812	27812	27812	27812	27812	27812	27812	27812
CONTRACT MINIMUM (KVA)	14643	14643	14643	14643	14643	14643	14643	14643	14643	14643	14643	14643
BILLING CAPACITY (KVA)	32734	34765	27812	27812	27812	27812	27812	27812	27812	27812	27812	30462
ACTUAL OR 80% PEAK	ACTUAL	ACTUAL	80% PEAK	80% PEAK	80% PEAK	80% PEAK	80% PEAK	80% PEAK	80% PEAK	80% PEAK	80% PEAK	ACTUAL
200 KVA @ $4.45	$890.00	$890.00	$890.00	$890.00	$890.00	$890.00	$890.00	$890.00	$890.00	$890.00	$890.00	$890.00
NEXT 400 @ $4.25	$1,700.00	$1,700.00	$1,700.00	$1,700.00	$1,700.00	$1,700.00	$1,700.00	$1,700.00	$1,700.00	$1,700.00	$1,700.00	$1,700.00
REMAINING @ $4.05	$130,142.18	$138,367.78	$110,208.22	$110,208.22	$110,208.22	$110,208.22	$110,208.22	$110,208.22	$110,208.22	$110,208.22	$110,208.22	$120,939.23
SUB DISCOUNT $.20	($6,546.77)	($6,952.98)	($5,562.38)	($5,562.38)	($5,562.38)	($5,562.38)	($5,562.38)	($5,562.38)	($5,562.38)	($5,562.38)	($5,562.38)	($6,092.31)
CAPACITY CHARGE	$126,185.40	$134,004.80	$107,235.84	$107,235.84	$107,235.84	$107,235.84	$107,235.84	$107,235.84	$107,235.84	$107,235.84	$107,235.84	$117,436.92
TOTAL ENERGY (KWH)	16,920,000	16,200,000	10,980,000	10,140,000	11,160,000	12,930,000	12,600,000	12,270,000	12,480,000	11,070,000	9,720,000	13,170,000
50*KVA @ $.03924	$64,223.85	$68,208.70	$54,566.96	$54,566.96	$54,566.96	$54,566.96	$54,566.96	$54,566.96	$54,566.96	$54,566.96	$54,566.96	$59,765.54
100*KVA @ $.03404	$111,426.10	$118,339.66	$94,671.73	$94,671.73	$94,671.73	$94,671.73	$94,671.73	$94,671.73	$94,671.73	$94,671.73	$94,671.73	$103,691.08
250*KVA @ $.03084	$252,378.15	$268,037.26	$209,965.32	$184,059.72	$214,429.80	$214,429.80	$214,429.80	$214,429.80	$214,429.80	$212,740.92	$171,106.92	$234,858.46
EXCESS @ $.02864	$109,589.57	$65,701.49	$0.00	$0.00	$1,009.19	$51,701.99	$42,250.79	$32,799.59	$38,813.99	$0.00	$0.00	$28,221.42
ENERGY CHARGE	$537,617.67	$520,287.11	$359,204.01	$333,298.41	$364,677.69	$415,370.49	$405,919.29	$396,468.09	$402,482.49	$361,979.61	$320,345.61	$426,536.49
TOTAL CHARGE LESS ECA	$663,803.07	$654,291.92	$466,439.85	$440,534.25	$471,913.53	$522,606.33	$513,155.13	$503,703.93	$509,718.33	$469,215.45	$427,581.45	$543,973.42
DEMAND REDUCTION (KW)	**7,600.00**	**7,600.00**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**7,600.00**
CAPACITY (KW)	29452	26852	26136	20754	26400	22752	27108	25812	23310	21834	21996	29452
POWER FACTOR (%)	99.20%	99.10%	99.10%	99.90%	99.80%	99.70%	99.50%	99.60%	99.60%	99.80%	99.60%	98.80%
CAPACITY (KVA)	29690	27096	26373	20775	26453	22820	27244	25916	23404	21878	22084	29810
80% SUMMER PEAK (KVA)	23848	23848	23848	23848	23848	23848	23848	23848	23848	23848	23848	23848
CONTRACT MINIMUM (KVA)	14643	14643	14643	14643	14643	14643	14643	14643	14643	14643	14643	14643
BILLING CAPACITY (KVA)	29690	27096	26373	23848	26453	23848	27244	25916	23848	23848	23848	29810
ACTUAL OR 80% PEAK	ACTUAL	ACTUAL	ACTUAL	80% PEAK	ACTUAL	80% PEAK	ACTUAL	ACTUAL	80% PEAK	80% PEAK	80% PEAK	ACTUAL
200 KVA @ $4.45	$890.00	$890.00	$890.00	$890.00	$890.00	$890.00	$890.00	$890.00	$890.00	$890.00	$890.00	$890.00
NEXT 400 @ $4.25	$1,700.00	$1,700.00	$1,700.00	$1,700.00	$1,700.00	$1,700.00	$1,700.00	$1,700.00	$1,700.00	$1,700.00	$1,700.00	$1,700.00
REMAINING @ $4.05	$117,812.54	$107,308.24	$104,382.11	$94,153.48	$104,704.27	$94,153.48	$107,909.10	$102,528.43	$94,153.48	$94,153.48	$94,153.48	$118,299.35
SUB DISCOUNT $.20	($5,937.90)	($5,419.17)	($5,274.67)	($4,769.55)	($5,290.58)	($4,769.55)	($5,448.84)	($5,183.13)	($4,769.55)	($4,769.55)	($4,769.55)	($5,961.94)
CAPACITY CHARGE	$114,464.64	$104,479.07	$101,697.44	$91,973.93	$102,003.69	$91,973.93	$105,050.25	$99,935.30	$91,973.93	$91,973.93	$91,973.93	$114,927.41
TOTAL ENERGY (KWH)	16,920,000	16,200,000	10,980,000	10,140,000	11,160,000	12,930,000	12,600,000	12,270,000	12,480,000	11,070,000	9,720,000	13,170,000
50*KVA @ $.03924	$58,250.83	$53,162.08	$51,744.53	$46,789.33	$51,900.60	$46,789.33	$53,453.16	$50,846.53	$46,789.33	$46,789.33	$46,789.33	$58,486.66
100*KVA @ $.03404	$101,063.11	$92,234.32	$89,774.92	$81,177.82	$90,045.69	$81,177.82	$92,739.33	$88,216.92	$81,177.82	$81,177.82	$81,177.82	$101,472.28
250*KVA @ $.03084	$228,906.17	$208,909.10	$203,338.61	$183,866.33	$203,951.90	$183,866.33	$210,052.94	$199,809.76	$183,866.33	$183,866.33	$183,866.33	$229,832.91
EXCESS @ $.02864	$144,465.70	$153,557.80	$12,333.99	$17,209.51	$16,577.91	$97,115.11	$48,754.20	$54,522.97	$84,227.11	$43,844.71	$5,180.71	$35,688.69
ENERGY CHARGE	$532,685.82	$507,863.30	$357,192.04	$329,042.99	$362,476.11	$408,948.59	$404,999.64	$393,396.17	$396,060.59	$355,678.19	$317,014.19	$425,480.54
TOTAL CHARGE LESS ECA	$647,150.45	$612,342.37	$458,889.48	$421,016.92	$464,479.79	$500,922.52	$510,049.89	$493,331.47	$488,034.52	$447,652.12	$408,988.12	$540,407.95
SUMMARY												
MONTHLY DIFFERENCE	$16,652.62	$41,949.55	$7,550.37	$19,517.33	$7,433.74	$21,683.81	$3,105.24	$10,372.46	$21,683.81	$21,563.33	$18,593.33	$3,565.47
COST SAVINGS.............		**$193,671.07**	COST SAVINGS PER KW....		$25.48							

E4
FIELD HARDWARE COSTS

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **1 - SMALL HOT WATER BOILER**

DATE: 12-Sep-95
ESTIMATOR: AJN
CHECKED BY: CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	1	EA	2.83	2.8	22.00	$62	$87.50	$88	$150	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	1	EA	2.83	2.8	22.00	$62	$65.00	$65	$127	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
									$0	
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	1	EA	2.33	2.3	22.00	$51	$87.50	$88	$139	1
DIFF. PRESS. SW. WATER (PLUM)	1	EA	1.83	1.8	23.00	$42	$55.50	$56	$97	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	1	EA	1.83	1.8	22.00	$40	$53.50	$54	$94	1
LEVEL SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	2	EA	2.83	5.7	22.00	$124	$158.00	$316	$440	1
WATER TEMPERATURE (PLUM)	2	EA	1.83	3.7	23.00	$84	$70.00	$140	$224	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	0	EA	2.83	0.0	22.00	$0	$136.50	$0	$0	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	1	EA	2.33	2.3	22.00	$51	$121.00	$121	$172	1
TOTAL THIS SHEET						$517		$926	$1,443	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **3 - SMALL STEAM BOILER**

DATE: 08-Dec-95
ESTIMATOR: AJN
CHECKED BY: CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	1	EA	2.83	2.8	22.00	$62	$87.50	$88	$150	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
									$0	
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	3	EA	1.83	5.5	22.00	$120	$53.50	$161	$281	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	1	EA	2.83	2.8	22.00	$62	$412.00	$412	$474	1
PSI/PSIG (PLUM)	1	EA	1.83	1.8	22.00	$40	$70.00	$70	$110	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	0	EA	2.83	0.0	22.00	$0	$136.50	$0	$0	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	0	EA	2.33	0.0	22.00	$0	$121.00	$0	$0	1
TOTAL THIS SHEET						$285		$730	$1,015	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **4 - LARGE STEAM BOILER**

DATE: 12-Sep-95
ESTIMATOR: AJN
CHECKED BY: CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		EXISTING? 0=YES,1=NO
CONTROL RELAY W/H-O-A	0	EA	2.83	0.0	22.00	$0	$87.50	$0	$0	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
									$0	
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	1	EA	1.83	1.8	22.00	$40	$57.50	$58	$98	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	3	EA	1.83	5.5	22.00	$120	$53.50	$161	$281	1
LEVEL SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	1	EA	2.83	2.8	22.00	$62	$412.00	$412	$474	1
PSI/PSIG (PLUM)	1	EA	1.83	1.8	22.00	$40	$70.00	$70	$110	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	0	EA	2.83	0.0	22.00	$0	$136.50	$0	$0	1
STACK TEMP (ELEC)	1	EA	2.83	2.8	22.00	$62	$195.00	$195	$257	1
STACK TEMP (PLUM)	1	EA	1.83	1.8	23.00	$42	$78.00	$78	$120	1
OXYGEN ANALYSER (ELEC)	1	EA	7.83	7.8	22.00	$172	$3,430.00	$3,430	$3,602	1
OXYGEN ANALYSER (PLUM)	1	EA	1.83	1.8	23.00	$42	$130.00	$130	$172	1
OUTSIDE AIR TEMPERATURE	1	EA	2.33	2.3	22.00	$51	$121.00	$121	$172	1
TOTAL THIS SHEET						$632		$4,654	$5,286	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **5 - STEAM TO HOT WATER CONVERTER**

DATE: 12-Sep-95
ESTIMATOR: AJN
CHECKED BY: CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	1	EA	2.83	2.8	22.00	$62	$87.50	$88	$150	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
									$0	
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	1	EA	2.83	2.8	22.00	$62	$210.00	$210	$272	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	1	EA	2.33	2.3	22.00	$51	$87.50	$88	$139	1
DIFF. PRESS. SW. WATER (PLUM)	1	EA	1.83	1.8	23.00	$42	$55.50	$56	$97	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	2	EA	2.83	5.7	22.00	$124	$158.00	$316	$440	1
WATER TEMPERATURE (PLUM)	2	EA	1.83	3.7	23.00	$84	$70.00	$140	$224	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	0	EA	2.83	0.0	22.00	$0	$136.50	$0	$0	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	1	EA	2.33	2.3	22.00	$51	$121.00	$121	$172	1
TOTAL THIS SHEET						$477		$1,018	$1,494	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **6 - SMALL AIR COOLED CHILLER**

DATE: 12-Sep-95
ESTIMATOR: AJN
CHECKED BY: CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	2	EA	2.83	5.7	22.00	$124	$87.50	$175	$299	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
									$0	
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	1	EA	2.33	2.3	22.00	$51	$87.50	$88	$139	1
DIFF. PRESS. SW. WATER (PLUM)	1	EA	1.83	1.8	23.00	$42	$55.50	$56	$97	1
CURRENT SWITCH	2	EA	1.83	3.7	22.00	$80	$100.50	$201	$281	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	2	EA	2.83	5.7	22.00	$124	$158.00	$316	$440	1
WATER TEMPERATURE (PLUM)	2	EA	1.83	3.7	23.00	$84	$70.00	$140	$224	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	0	EA	2.83	0.0	22.00	$0	$136.50	$0	$0	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	0	EA	2.33	0.0	22.00	$0	$121.00	$0	$0	1
TOTAL THIS SHEET						$506		$975	$1,481	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **7 - LARGE AIR COOLED CHILLER**

DATE: 12-Sep-95
ESTIMATOR: AJN
CHECKED BY: CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	2	EA	2.83	5.7	22.00	$124	$87.50	$175	$299	1
CONTROL RELAY	4	EA	2.08	8.3	22.00	$183	$49.50	$198	$381	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
									$0	
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	1	EA	2.33	2.3	22.00	$51	$87.50	$88	$139	1
DIFF. PRESS. SW. WATER (PLUM)	1	EA	1.83	1.8	23.00	$42	$55.50	$56	$97	1
CURRENT SWITCH	2	EA	1.83	3.7	22.00	$80	$100.50	$201	$281	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	2	EA	2.83	5.7	22.00	$124	$158.00	$316	$440	1
WATER TEMPERATURE (PLUM)	2	EA	1.83	3.7	23.00	$84	$70.00	$140	$224	1
SPACE RELATIVE HUMIDITY	1	EA	2.33	2.3	22.00	$51	$245.00	$245	$296	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	0	EA	2.83	0.0	22.00	$0	$136.50	$0	$0	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	1	EA	2.33	2.3	22.00	$51	$121.00	$121	$172	1
TOTAL THIS SHEET						$791		$1,539	$2,330	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **8 - AIR COOLED DX COMPRESSOR**

DATE: 12-Sep-95
ESTIMATOR: AJN
CHECKED BY: CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		EXISTING? 0=YES,1=NO
CONTROL RELAY W/H-O-A	1	EA	2.83	2.8	22.00	$62	$87.50	$88	$150	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
									$0	
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	1	EA	1.83	1.8	22.00	$40	$53.50	$54	$94	1
LEVEL SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	0	EA	2.83	0.0	22.00	$0	$136.50	$0	$0	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	0	EA	2.33	0.0	22.00	$0	$121.00	$0	$0	1
TOTAL THIS SHEET						$102		$141	$243	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **9 - WATER COOLED CHILLER**

DATE: 12-Sep-95
ESTIMATOR: AJN
CHECKED BY: CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	3	EA	2.83	8.5	22.00	$186	$87.50	$263	$449	1
CONTROL RELAY	1	EA	2.08	2.1	22.00	$46	$49.50	$50	$95	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
									$0	
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	1	EA	2.83	2.8	22.00	$62	$210.00	$210	$272	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	2	EA	2.83	5.7	22.00	$124	$310.50	$621	$745	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	1	EA	2.33	2.3	22.00	$51	$87.50	$88	$139	1
DIFF. PRESS. SW. WATER (PLUM)	1	EA	1.83	1.8	23.00	$42	$55.50	$56	$97	1
CURRENT SWITCH	2	EA	1.83	3.7	22.00	$80	$100.50	$201	$281	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	4	EA	2.83	11.3	22.00	$249	$158.00	$632	$881	1
WATER TEMPERATURE (PLUM)	4	EA	1.83	7.3	23.00	$168	$70.00	$280	$448	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	1	EA	2.33	2.3	22.00	$51	$278.50	$279	$330	1
PSI/PSIG (ELEC)	3	EA	2.83	8.5	22.00	$186	$412.00	$1,236	$1,422	1
PSI/PSIG (PLUM)	3	EA	1.83	5.5	22.00	$120	$70.00	$210	$330	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	1	EA	2.83	2.8	22.00	$62	$472.00	$472	$534	1
AMPS	1	EA	2.83	2.8	22.00	$62	$136.50	$137	$199	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	1	EA	2.33	2.3	22.00	$51	$121.00	$121	$172	1
TOTAL THIS SHEET						$1,542		$4,853	$6,395	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **10 - MULTIZONE AHU**

DATE: 12-Sep-95
ESTIMATOR: AJN
CHECKED BY: CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		EXISTING? 0=YES,1=NO
CONTROL RELAY W/H-O-A	1	EA	2.83	2.8	22.00	$62	$87.50	$88	$150	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
									$0	
POSITION DAMPER	6	EA	2.83	17.0	22.00	$373	$210.00	$1,260	$1,633	1
POSITION VALVE	2	EA	2.83	5.7	22.00	$124	$210.00	$420	$544	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	1	EA	2.33	2.3	22.00	$51	$60.50	$61	$112	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	5	EA	2.83	14.1	22.00	$311	$122.00	$610	$921	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	3	EA	2.83	8.5	22.00	$186	$122.00	$366	$552	1
AVG. TEMPERATURE	1	EA	3.33	3.3	22.00	$73	$154.00	$154	$227	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	1	EA	2.83	2.8	22.00	$62	$136.50	$137	$199	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	1	EA	2.33	2.3	22.00	$51	$121.00	$121	$172	1
TOTAL THIS SHEET						$1,294		$3,216	$4,510	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **11 - VAV AHU**

DATE: 12-Sep-95
ESTIMATOR: AJN
CHECKED BY: CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	1	EA	2.83	2.8	22.00	$62	$87.50	$88	$150	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
									$0	
POSITION DAMPER	1	EA	2.83	2.8	22.00	$62	$210.00	$210	$272	1
POSITION VALVE	2	EA	2.83	5.7	22.00	$124	$210.00	$420	$544	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	1	EA	2.33	2.3	22.00	$51	$60.50	$61	$112	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	8	EA	2.33	18.6	22.00	$409	$105.50	$844	$1,253	1
SPACE TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
SPACE TEMPERATURE (VAV)	8	EA	2.33	18.6	22.00	$409	$67.00	$536	$945	1
DUCT TEMPERATURE	2	EA	2.83	5.7	22.00	$124	$122.00	$244	$368	1
AVG. TEMPERATURE	1	EA	3.33	3.3	22.00	$73	$154.00	$154	$227	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	1	EA	2.83	2.8	22.00	$62	$412.00	$412	$474	1
PSI/PSIG (PLUM)	1	EA	1.83	1.8	22.00	$40	$70.00	$70	$110	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	0
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	0
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	1	EA	2.83	2.8	22.00	$62	$136.50	$137	$199	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	1	EA	2.33	2.3	22.00	$51	$121.00	$121	$172	1
TOTAL THIS SHEET						$1,531		$3,296	$4,827	

EMC

Engineers, Inc.

DENVER - ATLANTA

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS

LOCATION: FORT RILEY, KANSAS

EMC NO: 1406-001

CALC. BY: AJN

CHECKED BY: CEL

DATE: 11-Sep-95

VAV AHU COST ANALYSIS

BLDG NO.	AHU NO.	NO. OF VAV BOXES	UNIT COST FOR UCU INSTAL-LATION	TOTAL COST FOR UCUs (one UCU per VAV box)	FIELD HRDWR COST FOR AHU and VAV BOXES	TOTAL COST FOR DDC CONTROLS ON VAV AHU
301	AHU-1	8	$440	$3,520	$4,827	$8,347
301	AHU-2	8	$440	$3,520	$4,827	$8,347
301	AHU-3	8	$440	$3,520	$4,827	$8,347
302	AHU-1	12	$440	$5,280	$5,926	$11,206
722	AHU-1	4	$440	$1,760	$3,728	$5,488
835	AHU-1	12	$440	$5,280	$5,926	$11,206
7109	AHU-1	16	$440	$7,040	$7,025	$14,065
7245	AHU-1	2	$440	$880	$3,178	$4,058
7245	AHU-2	2	$440	$880	$3,178	$4,058
7410	AHU-1	8	$440	$3,520	$4,827	$8,347
7485	AHU-1	12	$440	$5,280	$5,926	$11,206
7606	AHU-1	2	$440	$880	$3,178	$4,058
7606	AHU-2	2	$440	$880	$3,178	$4,058
7654	AHU-1	2	$440	$880	$3,178	$4,058
7654	AHU-2	2	$440	$880	$3,178	$4,058
8100	AHU-6	14	$440	$6,160	$6,476	$12,636
8100	AHU-8	25	$440	$11,000	$9,498	$20,498

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **13 - LARGE SINGLE ZONE AHU**

DATE: 12-Sep-95
ESTIMATOR: AJN
CHECKED BY: CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	1	EA	2.83	2.8	22.00	$62	$87.50	$88	$150	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
									$0	
POSITION DAMPER	1	EA	2.83	2.8	22.00	$62	$210.00	$210	$272	1
POSITION VALVE	2	EA	2.83	5.7	22.00	$124	$210.00	$420	$544	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	1	EA	2.33	2.3	22.00	$51	$60.50	$61	$112	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	2	EA	2.83	5.7	22.00	$124	$122.00	$244	$368	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	2	EA	2.83	5.7	22.00	$124	$122.00	$244	$368	1
AVG. TEMPERATURE	1	EA	3.33	3.3	22.00	$73	$154.00	$154	$227	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	1	EA	2.83	2.8	22.00	$62	$136.50	$137	$199	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	1	EA	2.33	2.3	22.00	$51	$121.00	$121	$172	1
TOTAL THIS SHEET						$735		$1,678	$2,412	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **14 - LARGE SINGLE ZONE AHU with HUMIDIFICATION**

DATE: 09-Dec-95
ESTIMATOR: AJN
CHECKED BY: CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING?
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		0=YES,1=NO
CONTROL RELAY W/H-O-A	1	EA	2.83	2.8	22.00	$62	$87.50	$88	$150	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
									$0	
POSITION DAMPER	1	EA	2.83	2.8	22.00	$62	$210.00	$210	$272	1
POSITION VALVE	3	EA	2.83	8.5	22.00	$186	$210.00	$630	$816	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	1	EA	2.33	2.3	22.00	$51	$60.50	$61	$112	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	2	EA	2.83	5.7	22.00	$124	$122.00	$244	$368	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	2	EA	2.83	5.7	22.00	$124	$122.00	$244	$368	1
AVG. TEMPERATURE	1	EA	3.33	3.3	22.00	$73	$154.00	$154	$227	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	1	EA	2.33	2.3	22.00	$51	$245.00	$245	$296	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	1	EA	2.83	2.8	22.00	$62	$136.50	$137	$199	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	1	EA	2.33	2.3	22.00	$51	$121.00	$121	$172	1
TOTAL THIS SHEET						$848		$2,133	$2,981	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **15 - SMALL SINGLE ZONE AHU**

DATE: 13-Sep-95
ESTIMATOR: AJN
CHECKED BY CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	1	EA	2.83	2.8	22.00	$62	$87.50	$88	$150	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
POSITION DAMPER	1	EA	2.83	2.8	22.00	$62	$210.00	$210	$272	1
POSITION VALVE	2	EA	2.83	5.7	22.00	$124	$210.00	$420	$544	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	1	EA	2.83	2.8	22.00	$62	$122.00	$122	$184	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	2	EA	2.83	5.7	22.00	$124	$122.00	$244	$368	1
AVG. TEMPERATURE	1	EA	3.33	3.3	22.00	$73	$154.00	$154	$227	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	1	EA	2.83	2.8	22.00	$62	$136.50	$137	$199	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	1	EA	2.33	2.3	22.00	$51	$121.00	$121	$172	1
TOTAL THIS SHEET						$622		$1,495	$2,117	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **16 - HEATING & VENTILATING UNIT**

DATE: 13-Sep-95
ESTIMATOR: AJN
CHECKED BY CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	1	EA	2.83	2.8	22.00	$62	$87.50	$88	$150	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
POSITION DAMPER	1	EA	2.83	2.8	22.00	$62	$210.00	$210	$272	1
POSITION VALVE	1	EA	2.83	2.8	22.00	$62	$210.00	$210	$272	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	1	EA	2.83	2.8	22.00	$62	$122.00	$122	$184	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	1	EA	2.83	2.8	22.00	$62	$122.00	$122	$184	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	1	EA	2.83	2.8	22.00	$62	$136.50	$137	$199	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	1	EA	2.33	2.3	22.00	$51	$121.00	$121	$172	1
TOTAL THIS SHEET						$424		$1,009	$1,433	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **17 - HEATING & VENTILATING UNIT W/ RETURN FAN**

DATE: 13-Sep-95
ESTIMATOR: AJN
CHECKED BY CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		EXISTING? 0=YES,1=NO
CONTROL RELAY W/H-O-A	2	EA	2.83	5.7	22.00	$124	$87.50	$175	$299	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
POSITION DAMPER	1	EA	2.83	2.8	22.00	$62	$210.00	$210	$272	1
POSITION VALVE	1	EA	2.83	2.8	22.00	$62	$210.00	$210	$272	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	1	EA	2.83	2.8	22.00	$62	$122.00	$122	$184	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	1	EA	2.83	2.8	22.00	$62	$122.00	$122	$184	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	2	EA	2.83	5.7	22.00	$124	$136.50	$273	$397	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	1	EA	2.33	2.3	22.00	$51	$121.00	$121	$172	1
TOTAL THIS SHEET						$548		$1,233	$1,781	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **18 - DUAL DUCT AHU**

DATE: 13-Sep-95
ESTIMATOR: AJN
CHECKED BY CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	2	EA	2.83	5.7	22.00	$124	$87.50	$175	$299	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	1	EA	1.83	1.8	22.00	$40	$46.50	$47	$87	1
POSITION DAMPER	6	EA	2.83	17.0	22.00	$373	$210.00	$1,260	$1,633	1
POSITION VALVE	2	EA	2.83	5.7	22.00	$124	$210.00	$420	$544	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	1	EA	2.33	2.3	22.00	$51	$60.50	$61	$112	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	5	EA	2.83	14.1	22.00	$311	$122.00	$610	$921	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	3	EA	2.83	8.5	22.00	$186	$122.00	$366	$552	1
AVG. TEMPERATURE	1	EA	3.33	3.3	22.00	$73	$154.00	$154	$227	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	1	EA	2.33	2.3	22.00	$51	$245.00	$245	$296	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	2	EA	2.83	5.7	22.00	$124	$136.50	$273	$397	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	1	EA	2.33	2.3	22.00	$51	$121.00	$121	$172	1
TOTAL THIS SHEET						$1,510		$3,731	$5,241	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **19 - FAN COIL UNIT**

DATE: 13-Sep-95
ESTIMATOR: AJN
CHECKED BY CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		EXISTING? 0=YES,1=NO
CONTROL RELAY W/H-O-A	0	EA	2.83	0.0	22.00	$0	$87.50	$0	$0	1
CONTROL RELAY	1	EA	2.08	2.1	22.00	$46	$49.50	$50	$95	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	1	EA	1.83	1.8	22.00	$40	$57.50	$58	$98	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
ELECTRICAL CONDUIT AND WIRING PER AREA	400	LF	0.05	21.6	22.00	$475	$0.47	$189	$664	1
SPACE TEMPERATURE	1	EA	2.83	2.8	22.00	$62	$122.00	$122	$184	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	0	EA	2.83	0.0	22.00	$0	$136.50	$0	$0	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	1	EA	2.33	2.3	22.00	$51	$121.00	$121	$172	1
TOTAL THIS SHEET						$674		$539	$1,213	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **20 - INFRARED RADIANT HEATERS**

DATE: 13-Sep-95
ESTIMATOR: AJN
CHECKED BY CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	0	EA	2.83	0.0	22.00	$0	$87.50	$0	$0	1
CONTROL RELAY	1	EA	2.08	2.1	22.00	$46	$49.50	$50	$95	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	1	EA	1.83	1.8	22.00	$40	$57.50	$58	$98	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
ELECTRICAL CONDUIT AND WIRING PER AREA	400	LF	0.05	21.6	22.00	$475	$0.47	$189	$664	1
SPACE TEMPERATURE	1	EA	2.83	2.8	22.00	$62	$122.00	$122	$184	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	0	EA	2.83	0.0	22.00	$0	$136.50	$0	$0	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	1	EA	2.33	2.3	22.00	$51	$121.00	$121	$172	1
TOTAL THIS SHEET						$674		$539	$1,213	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **21 - HW UNIT HEATER**

DATE: 13-Sep-95
ESTIMATOR: AJN
CHECKED BY CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		EXISTING? 0=YES,1=NO
CONTROL RELAY W/H-O-A	0	EA	2.83	0.0	22.00	$0	$87.50	$0	$0	1
CONTROL RELAY	1	EA	2.08	2.1	22.00	$46	$49.50	$50	$95	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	1	EA	1.83	1.8	22.00	$40	$57.50	$58	$98	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
ELECTRICAL CONDUIT AND WIRING PER AREA	400	LF	0.05	21.6	22.00	$475	$0.47	$189	$664	1
SPACE TEMPERATURE	1	EA	2.83	2.8	22.00	$62	$122.00	$122	$184	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	0	EA	2.83	0.0	22.00	$0	$136.50	$0	$0	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	1	EA	2.33	2.3	22.00	$51	$121.00	$121	$172	1
TOTAL THIS SHEET						$674		$539	$1,213	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **22 - HEAT PUMP**

DATE: 13-Sep-95
ESTIMATOR: AJN
CHECKED BY CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	0	EA	2.83	0.0	22.00	$0	$87.50	$0	$0	1
CONTROL RELAY	1	EA	2.08	2.1	22.00	$46	$49.50	$50	$95	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	1	EA	1.83	1.8	22.00	$40	$57.50	$58	$98	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
ELECTRICAL CONDUIT AND WIRING PER AREA	400	LF	0.05	21.6	22.00	$475	$0.47	$189	$664	1
SPACE TEMPERATURE	1	EA	2.83	2.8	22.00	$62	$122.00	$122	$184	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	0	EA	2.83	0.0	22.00	$0	$136.50	$0	$0	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	1	EA	2.33	2.3	22.00	$51	$121.00	$121	$172	1
TOTAL THIS SHEET						$674		$539	$1,213	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **23 - VENTILATION FAN**

DATE: 13-Sep-95
ESTIMATOR: AJN
CHECKED BY CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		EXISTING? 0=YES,1=NO
CONTROL RELAY W/H-O-A	1	EA	2.83	2.8	22.00	$62	$87.50	$88	$150	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	1	EA	2.83	2.8	22.00	$62	$122.00	$122	$184	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	1	EA	2.83	2.8	22.00	$62	$136.50	$137	$199	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	0	EA	2.33	0.0	22.00	$0	$121.00	$0	$0	1
TOTAL THIS SHEET						$186		$346	$532	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **24 - DUAL TEMPERATURE WATER PUMP**

DATE: 12-Sep-95
ESTIMATOR: AJN
CHECKED BY CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	1	EA	2.83	2.8	22.00	$62	$87.50	$88	$150	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	1	EA	2.33	2.3	22.00	$51	$87.50	$88	$139	1
DIFF. PRESS. SW. WATER (PLUM)	1	EA	1.83	1.8	23.00	$42	$55.50	$56	$97	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	2	EA	2.83	5.7	22.00	$124	$122.00	$244	$368	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	2	EA	2.83	5.7	22.00	$124	$158.00	$316	$440	1
WATER TEMPERATURE (PLUM)	2	EA	1.83	3.7	23.00	$84	$70.00	$140	$224	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	0	EA	2.83	0.0	22.00	$0	$136.50	$0	$0	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	0	EA	2.33	0.0	22.00	$0	$121.00	$0	$0	1
TOTAL THIS SHEET						$488		$931	$1,418	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **25 - HW RADIATION PUMP**

DATE: 12-Sep-95
ESTIMATOR: AJN
CHECKED BY CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		EXISTING? 0=YES,1=NO
CONTROL RELAY W/H-O-A	1	EA	2.83	2.8	22.00	$62	$87.50	$88	$150	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	1	EA	2.33	2.3	22.00	$51	$87.50	$88	$139	1
DIFF. PRESS. SW. WATER (PLUM)	1	EA	1.83	1.8	23.00	$42	$55.50	$56	$97	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	1	EA	2.83	2.8	22.00	$62	$122.00	$122	$184	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	0	EA	2.83	0.0	22.00	$0	$136.50	$0	$0	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	0	EA	2.33	0.0	22.00	$0	$121.00	$0	$0	1
TOTAL THIS SHEET						$217		$353	$570	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **26 - PUMP**

DATE: 12-Sep-95
ESTIMATOR: AJN
CHECKED BY CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	1	EA	2.83	2.8	22.00	$62	$87.50	$88	$150	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	1	EA	2.33	2.3	22.00	$51	$87.50	$88	$139	1
DIFF. PRESS. SW. WATER (PLUM)	1	EA	1.83	1.8	23.00	$42	$55.50	$56	$97	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	0	EA	2.83	0.0	22.00	$0	$136.50	$0	$0	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	0	EA	2.33	0.0	22.00	$0	$121.00	$0	$0	1
TOTAL THIS SHEET						$155		$231	$386	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **27 - PERIMETER RADIATION VALVE**

DATE: 12-Sep-95
ESTIMATOR: AJN
CHECKED BY CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	0	EA	2.83	0.0	22.00	$0	$87.50	$0	$0	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	1	EA	2.83	2.8	22.00	$62	$210.00	$210	$272	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	1	EA	2.83	2.8	22.00	$62	$122.00	$122	$184	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	0	EA	2.83	0.0	22.00	$0	$136.50	$0	$0	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	0	EA	2.33	0.0	22.00	$0	$121.00	$0	$0	1
TOTAL THIS SHEET						$124		$332	$456	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **28 - DOMESTIC HW STORAGE TANK**

DATE: 12-Sep-95
ESTIMATOR: AJN
CHECKED BY CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	0	EA	2.83	0.0	22.00	$0	$87.50	$0	$0	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	1	EA	2.83	2.8	22.00	$62	$210.00	$210	$272	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	3	EA	2.83	8.5	22.00	$186	$158.00	$474	$660	1
WATER TEMPERATURE (PLUM)	3	EA	1.83	5.5	23.00	$126	$70.00	$210	$336	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	0	EA	2.83	0.0	22.00	$0	$136.50	$0	$0	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	0	EA	2.33	0.0	22.00	$0	$121.00	$0	$0	1
TOTAL THIS SHEET						$375		$894	$1,269	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **29 - WATER LEVEL ALARM**

DATE: 12-Sep-95
ESTIMATOR: AJN
CHECKED BY CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		EXISTING? 0=YES,1=NO
CONTROL RELAY W/H-O-A	0	EA	2.83	0.0	22.00	$0	$87.50	$0	$0	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	1	EA	2.33	2.3	22.00	$51	$105.50	$106	$157	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	0	EA	2.83	0.0	22.00	$0	$136.50	$0	$0	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	0	EA	2.33	0.0	22.00	$0	$121.00	$0	$0	1
TOTAL THIS SHEET						$51		$106	$157	

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
FILE: V:\1406.001\ENERGY\IO-SMCST\WLA_CST.XLS

EMC NO: 1406-001
CALC. BY: AJN
CHECKED BY: CEL
DATE: 20-Sep-95

WATER LEVEL ALARM COST ANALYSIS

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG	CONSTR. COST ($)
3	POST CHAPEL	WLA-1	$157
6	POST CHAPEL	WLA-1	$157
27	OFF QTRS MILIT	WLA-1	$157
29	RED CROSS BLDG	WLA-1	$157
200	ADMIN GENERAL PURP	WLA-1	$157
203	CAVALRY MUSEUM	WLA-1	$157
205	CAVALRY MUSEUM	WLA-1	$157
206	THEATER W/O DRESS RM	WLA-1	$157
207	CAVALRY MUSEUM	WLA-1	$157
210	MILIT PERS BLDG	WLA-1	$157
211	ADMIN	WLA-1	$157
214	ENL BARRACKS W/DAS	WLA-1	$157
222	ADMIN GENERAL PURP	WLA-1	$157
223	ENL BARRACKS W/DAS	WLA-1	$157
227	ENL BARRACKS W/AS	WLA-1	$157
301	FINANCE ADMIN	WLA-1	$157
302	FINANCE ADMIN	WLA-1	$157
313	CIV PERS BLDG	WLA-1	$157
330	PW ADMIN	WLA-1	$157
402	ENL BARRACKS W/AS	WLA-1	$157
403	ADMIN GENERAL (DESIGN PREP)	WLA-1	$157
404	ENL BARRACKS W/DAS	WLA-1	$157
405	ADMIN GENERAL PURP	WLA-1	$157
406	CID BLDG	WLA-1	$157
409	ENL BARRACKS W/AS	WLA-1	$157
410	ENL BARRACKS W/AS	WLA-1	$157
411	ENL BARRACKS W/AS	WLA-1	$157
500	POST HQ BLDG	WLA-1	$157
512	SR ENL QTRS	WLA-1	$157
602	DENTAL CLINIC	WLA-1	$157
610	ENL BARRACKS W/AS	WLA-1	$157
620	OFF QTRS MILIT	WLA-1	$157
621	OFF QTRS MILIT	WLA-1	$157
4010	DENTAL CLINIC	WLA-1	$157
5309	GUEST HOUSE	WLA-1	$157
5315	MORRIS HILL CHAPEL	WLA-1	$157
6620	COMMUN ACT CTR	WLA-1	$157
7050	ENL BARRACKS W/AS	WLA-1	$157
7053	ENL BARRACKS W/AS	WLA-1	$157
7086	UNIT CHAPEL	WLA-1	$157
7245	ENL PERS DIN	WLA-1	$157
7404	ENL BARRACKS W/O DIN	WLA-1	$157

PROJECT:	FEASIBILITY STUDY FOR INSTALLATION OF UMCS	EMC NO:	1406-001
LOCATION:	FORT RILEY, KANSAS	CALC. BY:	AJN
		CHECKED BY:	CEL
FILE:	V:\1406.001\ENERGY\IO-SMCST\WLA_CST.XLS	DATE:	20-Sep-95

WATER LEVEL ALARM COST ANALYSIS

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG	CONSTR. COST ($)
7424	ENL BARRACKS W/O DIN	WLA-1	$157
7606	ENL PERS DIN	WLA-1	$157
7610	ENL BARRACKS W/AS	WLA-1	$157
7612	ENL BARRACKS W/AS	WLA-1	$157
7614	ENL BARRACKS W/AS	WLA-1	$157
7616	ENL BARRACKS W/AS	WLA-1	$157
7618	ENL BARRACKS W/O DIN	WLA-1	$157
7642	ENL BARRACKS W/O DIN	WLA-1	$157
7644	ENL BARRACKS W/O DIN	WLA-1	$157
7646	ENL BARRACKS W/O DIN	WLA-1	$157
7648	ENL BARRACKS W/O DIN	WLA-1	$157
7650	ENL BARRACKS W/O DIN	WLA-1	$157
7654	ENL PERS DIN	WLA-1	$157
7665	DENTAL CLINIC	WLA-1	$157
7670	DENTAL CLINIC	WLA-1	$157
7804	ENL PERS DIN	WLA-1	$157
7810	ENL BARRACKS W/O DIN	WLA-1	$157
7812	ENL BARRACKS W/O DIN	WLA-1	$157
7814	ENL BARRACKS W/O DIN	WLA-1	$157
7816	ENL BARRACKS W/O DIN	WLA-1	$157
7818	ENL BARRACKS W/O DIN	WLA-1	$157
7842	ENL BARRACKS W/AS	WLA-1	$157
7844	ENL BARRACKS W/O DIN	WLA-1	$157
7846	ENL BARRACKS W/AS	WLA-1	$157
7848	ENL BARRACKS W/O DIN	WLA-1	$157
7850	ENL BARRACKS W/AS	WLA-1	$157
7856	ENL PERS DIN	WLA-1	$157
7865	UNIT CHAPEL	WLA-1	$157
8069	IN SW POOL/GYM	WLA-1	$157
	TOTAL WATER LEVEL ALARM COST		$11,147

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **30 - COLD STORAGE - BLDG 650**

DATE: 08-Dec-95
ESTIMATOR: AJN
CHECKED BY CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	0	EA	2.83	0.0	22.00	$0	$87.50	$0	$0	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	9	EA	1.83	16.4	22.00	$361	$105.50	$950	$1,311	1
SPACE TEMPERATURE	9	EA	2.83	25.4	22.00	$559	$122.00	$1,098	$1,657	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	4	EA	2.83	11.3	22.00	$249	$136.50	$546	$795	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	0	EA	2.33	0.0	22.00	$0	$121.00	$0	$0	1
TOTAL THIS SHEET						$1,169		$2,594	$3,763	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **31 - COLD STORAGE BLDG 652**

DATE: 08-Dec-95
ESTIMATOR: AJN
CHECKED BY CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	0	EA	2.83	0.0	22.00	$0	$87.50	$0	$0	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	1	EA	1.83	1.8	22.00	$40	$105.50	$106	$146	1
SPACE TEMPERATURE	1	EA	2.83	2.8	22.00	$62	$122.00	$122	$184	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	4	EA	2.83	11.3	22.00	$249	$136.50	$546	$795	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	0	EA	2.33	0.0	22.00	$0	$121.00	$0	$0	1
TOTAL THIS SHEET						$351		$774	$1,124	

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **32 - PNEUMATIC CONTROL AIR**

DATE: 12-Dec-95
ESTIMATOR: AJN
CHECKED BY CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE EXISTING? 0=YES,1=NO
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		
CONTROL RELAY W/H-O-A	0	EA	2.83	0.0	22.00	$0	$87.50	$0	$0	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
POSITION DAMPER	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION VALVE	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	1	EA	2.33	2.3	22.00	$51	$55.50	$56	$107	1
DIFF. PRESS. SW. AIR	0	EA	2.33	0.0	22.00	$0	$60.50	$0	$0	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	1.83	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	0	EA	2.83	0.0	22.00	$0	$122.00	$0	$0	1
AVG. TEMPERATURE	0	EA	3.33	0.0	22.00	$0	$154.00	$0	$0	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$245.00	$0	$0	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	0	EA	2.83	0.0	22.00	$0	$136.50	$0	$0	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	0	EA	2.33	0.0	22.00	$0	$121.00	$0	$0	1
TOTAL THIS SHEET						$51		$56	$107	

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
FILE: V:\1406.001\CSTEST\PCA_CST.XLS

EMC NO: 1406-001
CALC. BY: AJN
CHECKED BY: CEL
DATE: 11-Dec-95

PNEUMATIC CONTROL AIR MONITORING COST ANALYSIS

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG	CONSTR. COST ($)
203	CAVALRY MUSEUM	PCA-1	$107
205	CAVALRY MUSEUM	PCA-1	$107
207	CAVALRY MUSEUM	PCA-1	$107
210	MILIT PERS BLDG	PCA-1	$107
214	ENL BARRACKS W/DAS	PCA-1	$107
227	ENL BARRACKS W/AS	PCA-1	$107
253	DRUG ABUSE CTR	PCA-1	$107
301	FINANCE ADMIN	PCA-1	$107
302	FINANCE ADMIN	PCA-1	$107
319	GEN INSTRUCTION BLDG	PCA-1	$107
402	ENL BARRACKS W/AS	PCA-1	$107
404	ENL BARRACKS W/DAS	PCA-1	$107
405	ADMIN GENERAL PURP	PCA-1	$107
409	ENL BARRACKS W/AS	PCA-1	$107
410	ENL BARRACKS W/AS	PCA-1	$107
411	ENL BARRACKS W/AS	PCA-1	$107
512	SR ENL QTRS	PCA-1	$107
602	DENTAL CLINIC	PCA-1	$107
722	FLIGHT SIMULATOR	PCA-1	$107
724	FLIGHT SIMULATOR	PCA-1	$107
802	BN ADMIN & CLRM	PCA-1	$107
804	RGT HQ BUILD	PCA-1	$107
808	BN ADMIN & CLRM	PCA-1	$107
810	ADMIN & SUPPLY BLDG	PCA-1	$107
812	ADMIN & SUPPLY BLDG	PCA-1	$107
814	MEDICAL FAC - NEW	PCA-1	$107
817	MNT HANGAR AVUM	PCA-1	$107
820	TAC EQUIP SHOP	PCA-1	$107
833	AIRCRAFT HANGAR	PCA-1	$107
4010	DENTAL CLINIC	PCA-1	$107
5302	POST OFFICE	PCA-1	$107
5315	MORRIS HILL CHAPEL	PCA-1	$107
5800	YOUTH CTR	PCA-1	$107
6620	COMMUN ACT CTR	PCA-1	$107
6914	EXC MAIN RETL	PCA-1	$107
6940	INDOOR SWIM POOL	PCA-1	$107
7024	GYMNASIUM	PCA-1	$107
7033	BN HQ BLDG	PCA-1	$107
7034	CLINIC W/O BEDS	PCA-1	$107
7036	REGIMENTAL HQ BLDG	PCA-1	$107
7050	ENL BARRACKS W/AS	PCA-1	$107
7086	UNIT CHAPEL	PCA-1	$107

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
FILE: V:\1406.001\CSTEST\PCA_CST.XLS

EMC NO: 1406-001
CALC. BY: AJN
CHECKED BY: CEL
DATE: 11-Dec-95

PNEUMATIC CONTROL AIR MONITORING COST ANALYSIS

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG	CONSTR. COST ($)
7108	BN ADMIN & CLRM	PCA-1	$107
7212	CO HQ BLDG	PCA-1	$107
7220	CO HQ BLDG	PCA-1	$107
7245	ENL PERS DIN	PCA-1	$107
7264	LIBRARY MAIN	PCA-1	$107
7285	CLOTHING SALES	PCA-1	$107
7404	ENL BARRACKS W/O DIN	PCA-1	$107
7410	BN ADMIN & CLRM	PCA-1	$107
7424	ENL BARRACKS W/O DIN	PCA-1	$107
7432	ADMIN & SUPPLY BLDG	PCA-1	$107
7450	REGIMENTAL HQ BLDG	PCA-1	$107
7485	BOWLING ALLEY	PCA-1	$107
7602	ENL PERS DIN	PCA-1	$107
7604	ENL PERS DIN	PCA-1	$107
7606	ENL PERS DIN	PCA-1	$107
7608	ADMIN & SUPPLY BLDG	PCA-1	$107
7610	ENL BARRACKS W/AS	PCA-1	$107
7612	ENL BARRACKS W/AS	PCA-1	$107
7614	ENL BARRACKS W/AS	PCA-1	$107
7616	ENL BARRACKS W/AS	PCA-1	$107
7618	ENL BARRACKS W/O DIN	PCA-1	$107
7620	BN ADMIN & CLRM	PCA-1	$107
7622	BN ADMIN & CLRM	PCA-1	$107
7624	BN ADMIN & CLRM	PCA-1	$107
7626	BN ADMIN & CLRM	PCA-1	$107
7630	BN ADMIN & CLRM	PCA-1	$107
7632	GYMNASIUM	PCA-1	$107
7636	REGIMENTAL HQ BLDG	PCA-1	$107
7638	BN ADMIN & CLRM	PCA-1	$107
7642	ENL BARRACKS W/O DIN	PCA-1	$107
7644	ENL BARRACKS W/O DIN	PCA-1	$107
7646	ENL BARRACKS W/O DIN	PCA-1	$107
7648	ENL BARRACKS W/O DIN	PCA-1	$107
7650	ENL BARRACKS W/O DIN	PCA-1	$107
7652	ADMIN & SUPPLY BLDG	PCA-1	$107
7654	ENL PERS DIN	PCA-1	$107
7656	GEN INST BLDG	PCA-1	$107
7658	ADMIN & SUPPLY BLDG	PCA-1	$107
7665	DENTAL CLINIC	PCA-1	$107
7670	DENTAL CLINIC	PCA-1	$107
7802	ADMIN & SUPPLY BLDG	PCA-1	$107
7804	ENL PERS DIN	PCA-1	$107

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
FILE: V:\1406.001\CSTEST\PCA_CST.XLS

EMC NO: 1406-001
CALC. BY: AJN
CHECKED BY: CEL
DATE: 11-Dec-95

PNEUMATIC CONTROL AIR MONITORING COST ANALYSIS

BUILDING NUMBER	BUILDING NAME	SYSTEM TAG	CONSTR. COST ($)
7806	BN HQ BLDG	PCA-1	$107
7808	ADMIN & SUPPLY BLDG	PCA-1	$107
7810	ENL BARRACKS W/O DIN	PCA-1	$107
7812	ENL BARRACKS W/O DIN	PCA-1	$107
7814	ENL BARRACKS W/O DIN	PCA-1	$107
7816	ENL BARRACKS W/O DIN	PCA-1	$107
7818	ENL BARRACKS W/O DIN	PCA-1	$107
7820	BN ADMIN & CLRM	PCA-1	$107
7824	BN ADMIN & CLRM	PCA-1	$107
7826	CLINIC W/O BEDS	PCA-1	$107
7832	GYMNASIUM	PCA-1	$107
7836	BN ADMIN & CLRM	PCA-1	$107
7852	ADMIN & SUPPLY BLDG	PCA-1	$107
7854	BN ADMIN & CLRM	PCA-1	$107
7856	ENL PERS DIN	PCA-1	$107
7858	ADMIN & SUPPLY BLDG	PCA-1	$107
7865	UNIT CHAPEL	PCA-1	$107
7866	THEATER W/DRESS RM	PCA-1	$107
8010	DET DAY ROOM	PCA-1	$107
8020	DET DAY ROOM	PCA-1	$107
8025	BN ADMIN & CLRM	PCA-1	$107
8037	BN ADMIN & CLRM	PCA-1	$107
8046	DET DAY ROOM	PCA-1	$107
8056	DET DAY ROOM	PCA-1	$107
8063	ENL PERS DIN	PCA-1	$107
8065	CLINIC W/O BEDS	PCA-1	$107
8069	IN SW POOL/GYM	PCA-1	$107
8071	RGT HQ BUILD	PCA-1	$107
8390	TAC EQUIP SHOP	PCA-1	$107
TOTAL PNEUMATIC CONTROL AIR MONITORING COST			$11,984

COST ESTIMATE ANALYSIS

EMC ENGINEERS, INC.

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS
BLDG. NO.: TYPICAL
SYS. NO.: **33 - MULTIZONE AHU with HUMIDIFICATION**

DATE: 09-Dec-95
ESTIMATOR: AJN
CHECKED BY: CEL

POINT DESCRIPTION	Quantity		Labor				Material		TOTAL	REUSE
	No. Of Units	Unit Meas	MH/ Unit	Total Hrs	Unit Price	Cost	Unit Price	Cost		EXISTING? 0=YES,1=NO
CONTROL RELAY W/H-O-A	1	EA	2.83	2.8	22.00	$62	$87.50	$88	$150	1
CONTROL RELAY	0	EA	2.08	0.0	22.00	$0	$49.50	$0	$0	1
CONTROL RELAY W/CONTACTOR	0	EA	2.83	0.0	22.00	$0	$65.00	$0	$0	1
SOLENOID	0	EA	1.83	0.0	22.00	$0	$46.50	$0	$0	1
									$0	
POSITION DAMPER	6	EA	2.83	17.0	22.00	$373	$210.00	$1,260	$1,633	1
POSITION VALVE	3	EA	2.83	8.5	22.00	$186	$210.00	$630	$816	1
POSITION DECK	0	EA	2.83	0.0	22.00	$0	$210.00	$0	$0	1
CPA	0	EA	2.83	0.0	22.00	$0	$310.50	$0	$0	1
PRESSURE SWITCH AIR	0	EA	2.33	0.0	22.00	$0	$55.50	$0	$0	1
DIFF. PRESS. SW. AIR	1	EA	2.33	2.3	22.00	$51	$60.50	$61	$112	1
DIFF. PRESS. SW. WATER (ELEC)	0	EA	2.33	0.0	22.00	$0	$87.50	$0	$0	1
DIFF. PRESS. SW. WATER (PLUM)	0	EA	1.83	0.0	23.00	$0	$55.50	$0	$0	1
CURRENT SWITCH	0	EA	1.83	0.0	22.00	$0	$100.50	$0	$0	1
AUXILIARY CONTACT	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
PULSE	0	EA	1.83	0.0	22.00	$0	$57.50	$0	$0	1
STATUS RELAY	0	EA	1.83	0.0	22.00	$0	$53.50	$0	$0	1
LEVEL SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
TEMPERATURE SWITCH	0	EA	1.83	0.0	22.00	$0	$75.50	$0	$0	1
PUSH BUTTON SWITCH	0	EA	2.33	0.0	22.00	$0	$105.50	$0	$0	1
SPACE TEMPERATURE	5	EA	2.83	14.1	22.00	$311	$122.00	$610	$921	1
SPACE TEMPERATURE (VAV)	0	EA	2.33	0.0	22.00	$0	$67.00	$0	$0	1
DUCT TEMPERATURE	3	EA	2.83	8.5	22.00	$186	$122.00	$366	$552	1
AVG. TEMPERATURE	1	EA	3.33	3.3	22.00	$73	$154.00	$154	$227	1
WATER TEMPERATURE (ELEC)	0	EA	2.83	0.0	22.00	$0	$158.00	$0	$0	1
WATER TEMPERATURE (PLUM)	0	EA	1.83	0.0	23.00	$0	$70.00	$0	$0	1
SPACE RELATIVE HUMIDITY	1	EA	2.33	2.3	22.00	$51	$245.00	$245	$296	1
DUCT RELATIVE HUMIDITY	0	EA	2.33	0.0	22.00	$0	$278.50	$0	$0	1
PSI/PSIG (ELEC)	0	EA	2.83	0.0	22.00	$0	$412.00	$0	$0	1
PSI/PSIG (PLUM)	0	EA	1.83	0.0	22.00	$0	$70.00	$0	$0	1
FLOW (ELEC)	0	EA	2.83	0.0	22.00	$0	$752.00	$0	$0	1
FLOW (PLUM)	0	EA	1.83	0.0	22.00	$0	$80.00	$0	$0	1
kW	0	EA	2.83	0.0	22.00	$0	$472.00	$0	$0	1
AMPS	1	EA	2.83	2.8	22.00	$62	$136.50	$137	$199	1
STACK TEMP (ELEC)	0	EA	2.83	0.0	22.00	$0	$195.00	$0	$0	1
STACK TEMP (PLUM)	0	EA	1.83	0.0	23.00	$0	$78.00	$0	$0	1
OXYGEN ANALYSER (ELEC)	0	EA	7.83	0.0	22.00	$0	$3,430.00	$0	$0	1
OXYGEN ANALYSER (PLUM)	0	EA	1.83	0.0	23.00	$0	$130.00	$0	$0	1
OUTSIDE AIR TEMPERATURE	1	EA	2.33	2.3	22.00	$51	$121.00	$121	$172	1
TOTAL THIS SHEET						$1,407		$3,671	$5,078	

Index	Description	Unit	MH/Unit	Comm Cost	TOTAL MH/Unit	Inst. rate ($/Hr)	Material ($)	Comm Cost	Material ($)
DO1	CONTROL RELAY W/H-O-A	EA	2.0	0.83	2.83	22	62.0	26	87.5
DO2	CONTROL RELAY	EA	1.3	0.83	2.08	22	24.0	26	49.5
DO3	CONTROL RELAY W/CONTACTOR	EA	2.0	0.83	2.83	22	39.5	26	65.0
DO4	SOLENOID	EA	1.0	0.83	1.83	22	21.0	26	46.5
DO5									0.0
AO1	POSITION DAMPER	EA	2.0	0.83	2.83	22	180.0	30	210.0
AO2	POSITION VALVE	EA	2.0	0.83	2.83	22	180.0	30	210.0
AO3	POSITION DECK	EA	2.0	0.83	2.83	22	180.0	30	210.0
AO4	CPA	EA	2.0	0.83	2.83	22	280.5	30	310.5
AO5									
AO6									0.0
DI1	PRESSURE SWITCH AIR	EA	1.5	0.83	2.33	22	30.0	26	55.5
DI2	DIFF. PRESS. SW. AIR	EA	1.5	0.83	2.33	22	35.0	26	60.5
DI3-1	DIFF. PRESS. SW. WATER (ELEC)	EA	1.5	0.83	2.33	22	62.0	26	87.5
DI3-2	DIFF. PRESS. SW. WATER (PLUM)	EA	1.0	0.83	1.83	23	30.0	26	55.5
DI4	CURRENT SWITCH	EA	1.0	0.83	1.83	22	75.0	26	100.5
DI5	AUXILIARY CONTACT	EA	1.0	0.83	1.83	22	32.0	26	57.5
DI6	PULSE	EA	1.0	0.83	1.83	22	32.0	26	57.5
DI7	STATUS RELAY	EA	1.0	0.83	1.83	22	28.0	26	53.5
DI8	LEVEL SWITCH	EA	1.5	0.83	2.33	22	80.0	26	105.5
DI9	TEMPERATURE SWITCH	EA	1.0	0.83	1.83	22	50.0	26	75.5
DI10	PUSH BUTTON SWITCH	EA	1.5	0.83	2.33	22	80.0	26	105.5
DI11									
DI12									0.0
AI1	SPACE TEMPERATURE	EA	2.0	0.83	2.83	22	92.0	30	122.0
AI2	SPACE TEMPERATURE (VAV)	EA	1.5	0.83	2.33	22	37.0	30	67.0
AI3	DUCT TEMPERATURE	EA	2.0	0.83	2.83	22	92.0	30	122.0
AI4	AVG. TEMPERATURE	EA	2.5	0.83	3.33	22	124.0	30	154.0
AI5-1	WATER TEMPERATURE (ELEC)	EA	2.0	0.83	2.83	22	128.0	30	158.0
AI5-2	WATER TEMPERATURE (PLUM)	EA	1.0	0.83	1.83	23	40.0	30	70.0
AI6	SPACE RELATIVE HUMIDITY	EA	1.5	0.83	2.33	22	215.0	30	245.0
AI7	DUCT RELATIVE HUMIDITY	EA	1.5	0.83	2.33	22	248.5	30	278.5
AI8-1	PSI/PSIG (ELEC)	EA	2.0	0.83	2.83	22	382.0	30	412.0
AI8-2	PSI/PSIG (PLUM)	EA	1.0	0.83	1.83	22	40.0	30	70.0
AI9-1	FLOW (ELEC)	EA	2.0	0.83	2.83	22	722.0	30	752.0
AI9-2	FLOW (PLUM)	EA	1.0	0.83	1.83	22	50.0	30	80.0
AI10	kW	EA	2.0	0.83	2.83	22	442.0	30	472.0
AI11	AMPS	EA	2.0	0.83	2.83	22	106.5	30	136.5
AI12	OUTSIDE AIR TEMPERATURE	EA	1.5	0.83	2.33	22	91.0	30	121.0
AI13	STACK TEMP (ELEC)	EA	2.0	0.83	2.83	22	165.0	30	195.0
AI14	STACK TEMP (PLUM)	EA	1.0	0.83	1.83	23	48.0	30	78.0
AI15	OXYGEN ANALYSER (ELEC)	EA	7.0	0.83	7.83	22	3400.0	30	3430.0
AI16	OXYGEN ANALYSER (PLUM)	EA	1.0	0.83	1.83	23	100.0	30	130.0

COMMON COST								
Digital Points	**Qaunity**	**Unit**	**MH/Unit**	**Labor**	**Total**	**Price**	**Total**	**Total**
Wiring #18-1 pair	50	ft	0.01	22	$11.00	0.09	$4.50	$15.50
1/2" EMT Conduit	50	ft	0.002	22	$1.65	0.42	$21.00	$22.65
Termination	1	LS	0.25	22	$5.50		$0.00	$5.50
	Sub Total		**0.83**		**$18.15**		**$25.50**	**$43.65**
Analog Points	**Qaunity**	**Unit**	**MH/Unit**	**Labor**	**Total**	**Price**	**Total**	**Total**
Wiring #18 TSP	50	ft	0.01	22	$11.00	0.18	$9.00	$20.00
1/2" EMT Conduit	50	ft	0.002	22	$1.65	0.42	$21.00	$22.65
Termination	1	LS	0.25	22	$5.50		$0.00	$5.50
	Sub Total		**0.83**		**$18.15**		**$30.00**	**$48.15**

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS

EMC NO: 1406-001
CALC. BY: AJN
CHECKED BY: CEL
DATE: 10-Dec-95
FILE: V:\1406.001\CSTEST\RCU_CST.XLS

RCU / ACU / UCU COST

BLDG NO.	BLDG NAME	SQ FT	USE	NO. OF ACUs	COST per ACU	ACU COST	RCU COST	UCU COST	RCU/ACU/UCU COST TOTAL
3	POST CHAPEL	8,828	Church - block	1	$800	$800	$328		$1,128
6	POST CHAPEL	6,230	Church - block	1	$800	$800	$328		$1,128
27	OFF QTRS MILIT	38,146	Barracks - block	1	$800	$800	$328		$1,128
29	RED CROSS BLDG	3,000	Admin - block	1	$800	$800	$328		$1,128
200	ADMIN GENERAL PURP	60,690	Admin - block	1	$800	$800	$469		$1,269
202	PHYS FITNESS CTR	51,307	Gym - block	1	$800	$800	$469		$1,269
203	CAVALRY MUSEUM	5,800	Admin - block	1	$800	$800	$469		$1,269
205	CAVALRY MUSEUM	16,496	Admin - block	1	$800	$800	$469		$1,269
206	THEATER W/O DRESS RM	10,754	Theater	1	$800	$800	$469		$1,269
207	CAVALRY MUSEUM	8,278	Admin - block	2	$800	$1,600	$469		$2,069
210	MILIT PERS BLDG	58,448	Admin - block	3	$800	$2,400	$547		$2,947
211	ADMIN	41,062	Admin - block	1	$800	$800	$469		$1,269
214	ENL BARRACKS W/AS	35,821	Barracks - block	2	$800	$1,600	$547		$2,147
222	ADMIN GEN PURP	18,854	Admin - block	1	$800	$800	$547		$1,347
223	ENL BARRACKS W/DAS	47,794	Barracks - block	2	$800	$1,600	$547		$2,147
227	ENL BARRACKS W/AS	32,303	Barracks - block	2	$800	$1,600	$547		$2,147
253	DRUG ABUSE CTR	11,122	Clinic	3	$800	$2,400	$547		$2,947
301	FINANCE ADMIN	32,947	Admin - block	2	$800	$1,600	$328	$10,560	$12,488
302	FINANCE ADMIN	16,138	Admin - block	1	$800	$800	$328	$5,280	$6,408
313	CIV PERS BLDG	6,222	Admin	1	$800	$800	$328		$1,128
319	GEN INSTRUCTION BLDG	9,690	Training	1	$800	$800	$328		$1,128
330	DEH ADMIN	14,913	Admin - block	1	$800	$800	$328		$1,128
364	UEMCS HQ (Admin-block Type)	744	Admin - block	1	$800	$800	$328		$1,128
402	ENL BARRACKS W/AS	35,718	Barracks - block	1	$800	$800	$234		$1,034
403	ADM GENERAL (DESIGN PREP)	18,151	Admin - block	1	$800	$800	$234		$1,034
404	ENL BARRACKS W/DAS	35,718	Barracks - block	2	$800	$1,600	$234		$1,834
405	ADMIN GEN PURP	10,778	Admin - block	1	$800	$800	$234		$1,034
406	CID BLDG	10,390	Admin - block	1	$800	$800	$234		$1,034
409	ENL BARRACKS W/AS	32,883	Barracks - block	2	$800	$1,600	$234		$1,834
410	ENL BARRACKS W/AS	32,883	Barracks - block	1	$800	$800	$234		$1,034
411	ENL BARRACKS W/AS	32,883	Barracks - block	2	$800	$1,600	$234		$1,834
500	POST HQ BLDG	65,453	Admin - block	1	$800	$800	$234		$1,034
509	ADM GEN PURPOSE	10,108	Admin - block	1	$800	$800	$234		$1,034
512	SR ENL QTRS	13,619	Barracks - block	1	$800	$800	$234		$1,034
540	OFF QTRS MILIT	14,528	Barracks - block	1	$800	$800	$234		$1,034
541	OFF QTRS MILIT	18,083	Barracks - block	1	$800	$800	$234		$1,034
542	OFF QTRS MILIT	14,528	Barracks - block	1	$800	$800	$234		$1,034
602	DENTAL CLINIC	11,557	Clinic	2	$800	$1,600	$547		$2,147
610	ENL BARRACKS W/AS	29,004	Barracks	1	$800	$800	$547		$1,347
620	OFF QTRS MILIT	12,640	Barracks	1	$800	$800	$547		$1,347
621	OFF QTRS TRANS	10,723	Barracks	1	$800	$800	$547		$1,347
650	COLD STOR FAC	22,331	Cold Storage	1	$800	$800	$547		$1,347
652	COLD STOR FAC	8,167	Cold Storage	1	$800	$800	$547		$1,347
710	TAC EQUIP SHOP	2,173	Maintenance	1	$800	$800	$364		$1,164
720	AF OPS BLDG	3,705	Simulator	1	$800	$800	$364		$1,164
722	FLIGHT SIMULATOR	7,000	Simulator	2	$800	$1,600	$364	$1,760	$3,724
723	MNT HANGAR COMB	21,640	Hangar	1	$800	$800	$364		$1,164
724	FLIGHT SIMULATOR	13,188	Simulator	2	$800	$1,600	$364		$1,964
727	MNT HANGAR COMB	36,152	Hangar	2	$800	$1,600	$364		$1,964
741	MNT HANGAR COMB	38,898	Hangar	1	$800	$800	$364		$1,164
751	AC PTS & TOE ST	9,834	Admin & Supp	1	$800	$400	$364		$764
760	BN HQ BLDG	7,364	Battalian	1	$800	$400	$364		$764
802	BN ADMIN & CLRM	12,526	Battalian	1	$800	$800	$252		$1,052
804	RGT HQ BUILD	10,241	Admin	1	$800	$800	$252		$1,052
806	COMB AC-HTG PLANT	1,000	Mechanical	1	$800	$800	$252		$1,052
808	BN ADMIN & CLRM	12,526	Battalian	1	$800	$800	$252		$1,052
810	ADMIN & SUPPLY BLDG	15,152	Admin & Supp	1	$800	$800	$252		$1,052
812	ADMIN & SUPPLY BLDG	23,559	Admin & Supp	2	$800	$1,600	$252		$1,852
814	MEDICAL FAC - NEW	9,220	Clinic	1	$800	$800	$252		$1,052
817	MNT HANGAR AVUM	40,061	Hangar	2	$800	$1,600	$252		$1,852

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS

EMC NO: 1406-001
CALC. BY: AJN
CHECKED BY: CEL
DATE: 10-Dec-95
FILE: V:\1406.001\CSTEST\RCU_CST.XLS

RCU / ACU / UCU COST

BLDG NO.	BLDG NAME	SQ FT	USE	NO. OF ACUs	COST per ACU	ACU COST	RCU COST	UCU COST	RCU/ACU/UCU COST TOTAL
820	TAC EQUIP SHOP	20,564	Maintenance	1	$800	$800	$252		$1,052
833	AIRCRAFT HANGAR	52,080	Hangar	2	$800	$1,600	$252		$1,852
835	MAF OPS BLDG	19,470	Admin & Supp	1	$800	$800	$252	$5,280	$6,332
840	VEHICLE MNT SHOP ORG	9,152	Maintenance	1	$800	$800	$252		$1,052
853	MNT HANGAR AVUM	48,112	Hangar	1	$800	$800	$252		$1,052
1470	AR VEH MNT SHOP	21,667	Maintenance	0	$800	$0	$3,280		$3,280
4010	DENTAL CLINIC	15,587	Clinic	1	$800	$800	$547		$1,347
5000	FIRE STATION	8,400	24 hours	1	$800	$800	$547		$1,347
5302	POST OFFICE	12,240	Post Office	1	$800	$800	$547		$1,347
5309	GUEST HOUSE	23,784	Barracks	1	$800	$800	$547		$1,347
5315	MORRIS HILL CHAPEL	19,748	Church	1	$800	$800	$547		$1,347
5800	YOUTH CTR	21,560	Youth Center	2	$800	$1,600	$547		$2,147
6620	COMMUN ACT CTR	31,740	Training	2	$800	$1,600	$410		$2,010
6910	EXC SP ST FAC	2,525	Retail	1	$800	$800	$410		$1,210
6914	EXC MAIN RETL	63,930	Retail	3	$800	$2,400	$410		$2,810
6918	SKILL DEV CTR	11,507	Training	2	$800	$1,600	$410		$2,010
6940	INDOOR SWIM POOL	23,347	Swimming Pool	1	$800	$800	$410		$1,210
7017	BN HQ BLDG	2,604	Battalian	1	$800	$800	$328		$1,128
7024	GYMNASIUM	20,619	Recreation	2	$800	$1,600	$328		$1,928
7028	BN CLASSROOMS	3,733	Battalion	1	$800	$800	$328		$1,128
7031	BN HQ BLDG	3,733	Battalian	1	$800	$800	$328		$1,128
7033	BN HQ BLDG	4,083	Battalian	1	$800	$800	$328		$1,128
7034	CLINIC W/O BEDS	3,842	Clinic	1	$800	$800	$328		$1,128
7036	REGIMENTAL HQ BLDG	10,010	Admin	1	$800	$800	$328		$1,128
7046	BN CLASSROOMS	3,733	Battalion	1	$800	$800	$273		$1,073
7047	BN HQ BLDG	3,733	Battalian	1	$800	$800	$273		$1,073
7048	BN HQ BLDG	2,604	Battalian	1	$800	$800	$273		$1,073
7050	ENL BARRACKS W/AS	39,675	Barracks & Din	1	$800	$800	$273		$1,073
7053	ENL BARRACKS W/AS	39,675	Barracks & Din	1	$800	$800	$273		$1,073
7086	UNIT CHAPEL	8,696	Church	1	$800	$800	$328		$1,128
7108	BN ADMIN & CLRM	12,527	Battalian	1	$800	$800	$410		$1,210
7109	BN ADMIN & CLRM	13,535	Battalian	1	$800	$800	$410	$7,040	$8,250
7176	MOTOR POOL MNT SHOP	4,880	Maintenance	1	$800	$400	$328		$728
7178	MOTOR POOL ADMIN	2,480	Admin	1	$800	$400	$328		$728
7212	CO HQ BLDG	19,320	Admin & Supp	1	$800	$800	$273		$1,073
7215	BN HQ BLDG	2,604	Battalian	1	$800	$800	$273		$1,073
7218	BN HQ BLDG	12,625	Battalian	1	$800	$800	$273		$1,073
7220	CO HQ BLDG	18,870	Admin & Supp	1	$800	$800	$273		$1,073
7243	ADMIN & SUPPLY BLDG	17,829	Admin & Supp	1	$800	$800	$273		$1,073
7245	ENL PERS DIN	13,998	Dining	1	$800	$800	$273	$1,760	$2,833
7264	LIBRARY MAIN	31,240	Training	2	$800	$1,600	$273		$1,873
7270	BN HQ BLDG	6,130	Battalian	1	$800	$800	$273		$1,073
7285	CLOTHING SALES	17,042	Retail	1	$800	$800	$273		$1,073
7305	APP INSTR BLDG	9,872	Training	1	$800	$800	$273		$1,073
7350	VEH MNT SHOP ORG	21,345	Maintenance	2	$800	$1,600	$273		$1,873
7404	ENL BARRACKS W/O DIN	50,967	Barracks	1	$800	$800	$273		$1,073
7410	BN ADMIN & CLRM	12,599	Battalian	1	$800	$800	$273	$3,520	$4,593
7424	ENL BARRACKS W/O DIN	50,967	Barracks	1	$800	$800	$273		$1,073
7432	ADMIN & SUPPLY BLDG	13,500	Admin & Supp	1	$800	$800	$364		$1,164
7450	REGIMENTAL HQ BLDG	9,850	Admin	1	$800	$800	$273		$1,073
7485	BOWLING ALLEY	36,966	Recreation	2	$800	$1,600	$364	$5,280	$7,244
7500	VEH MNT SHOP ORG	22,325	Maintenance	2	$800	$1,600	$273		$1,873
7520	VEH MNT SHOP ORG	27,112	Maintenance	2	$800	$1,600	$273		$1,873
7602	ADMIN & SUPPLY BLDG	13,520	Admin & Supp	1	$800	$800	$469		$1,269
7604	GEN INST BLDG	13,493	Training	2	$800	$1,600	$364		$1,964
7606	ENL PERS DIN (Dining Area)	13,493	Dining	2	$800	$1,600	$469	$1,760	$3,829
7608	ADMIN & SUPPLY BLDG	13,520	Admin & Supp	1	$800	$800	$364		$1,164
7610	ENL BARRACKS W/AS	41,892	Barracks	2	$800	$1,600	$469		$2,069
7612	ENL BARRACKS W/AS	41,892	Barracks	2	$800	$1,600	$469		$2,069
7614	ENL BARRACKS W/AS	41,892	Barracks	2	$800	$1,600	$469		$2,069

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
LOCATION: FORT RILEY, KANSAS

EMC NO: 1406-001
CALC. BY: AJN
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DATE: 10-Dec-95
FILE: V:\1406.001\CSTEST\RCU_CST.XLS

RCU / ACU / UCU COST

BLDG NO.	BLDG NAME	SQ FT	USE	NO. OF ACUs	COST per ACU	ACU COST	RCU COST	UCU COST	RCU/ACU/UCU COST TOTAL
7616	ENL BARRACKS W/AS	41,892	Barracks	2	$800	$1,600	$469		$2,069
7618	ENL BARRACKS W/O DIN	41,892	Barracks	2	$800	$1,600	$469		$2,069
7620	BN ADMIN & CLRM	6,340	Battalian	1	$800	$800	$410		$1,210
7622	BN ADMIN & CLRM	12,380	Battalian	2	$800	$1,600	$410		$2,010
7624	BN ADMIN & CLRM	6,158	Battalian	1	$800	$800	$410		$1,210
7626	CLINIC W/O BEDS	3,604	Clinic	1	$800	$800	$410		$1,210
7630	BN ADMIN & CLRM	6,158	Battalian	1	$800	$800	$410		$1,210
7632	GYMNASIUM	20,694	Recreation	1	$800	$800	$410		$1,210
7636	REGIMENTAL HQ BLDG	9,850	Admin	1	$800	$800	$410		$1,210
7638	BN ADMIN & CLRM	6,158	Battalian	1	$800	$800	$410		$1,210
7642	ENL BARRACKS W/O DIN	41,892	Barracks	2	$800	$1,600	$298		$1,898
7644	ENL BARRACKS W/O DIN	41,892	Barracks	2	$800	$1,600	$298		$1,898
7646	ENL BARRACKS W/O DIN	41,892	Barracks	2	$800	$1,600	$298		$1,898
7648	ENL BARRACKS W/O DIN	41,892	Barracks	2	$800	$1,600	$298		$1,898
7650	ENL BARRACKS W/O DIN	41,892	Barracks	2	$800	$1,600	$298		$1,898
7652	ADMIN & SUPPLY BLDG	13,520	Admin & Supp	1	$800	$800	$298		$1,098
7654	ENL PERS DIN	13,493	Dining	2	$800	$1,600	$298	$1,760	$3,658
7656	GEN INST BLDG	13,493	Training	2	$800	$1,600	$298		$1,898
7658	ADMIN & SUPPLY BLDG	13,520	Admin & Supp	1	$800	$800	$298		$1,098
7665	DENTAL CLINIC	11,076	Clinic	1	$800	$800	$364		$1,164
7670	DENTAL CLINIC	14,960	Clinic	1	$800	$800	$364		$1,164
7720	VEH MNT SHOP ORG	22,325	Maintenance	2	$800	$1,600	$364		$1,964
7739	MOVING TARGET SIM BLDG	4,074	Simulator	1	$800	$800	$364		$1,164
7760	VEH MNT SHOP ORG	17,163	Maintenance	2	$800	$1,600	$298		$1,898
7780	VEH MNT SHOP ORG	17,163	Maintenance	2	$800	$1,600	$298		$1,898
7802	ADMIN & SUPPLY BLDG	13,280	Admin & Supp	1	$800	$800	$298		$1,098
7804	ENL PERS DIN	13,493	Dining	1	$800	$800	$298		$1,098
7806	BN HQ BLDG	13,493	Battalian	1	$800	$800	$298		$1,098
7808	ADMIN & SUPPLY BLDG	13,280	Admin & Supp	1	$800	$800	$298		$1,098
7810	ENL BARRACKS W/O DIN	41,843	Barracks	2	$800	$1,600	$298		$1,898
7812	ENL BARRACKS W/O DIN	41,843	Barracks	2	$800	$1,600	$298		$1,898
7814	ENL BARRACKS W/O DIN	41,843	Barracks	2	$800	$1,600	$298		$1,898
7816	ENL BARRACKS W/O DIN	41,843	Barracks	2	$800	$1,600	$298		$1,898
7818	ENL BARRACKS W/O DIN	41,843	Barracks	2	$800	$1,600	$298		$1,898
7820	BN ADMIN & CLRM	6,673	Battalian	1	$800	$800	$410		$1,210
7824	BN ADMIN & CLRM	12,246	Battalian	2	$800	$1,600	$410		$2,010
7826	CLINIC W/O BEDS	3,841	Clinic	1	$800	$800	$410		$1,210
7832	GYMNASIUM	20,694	Recreation	1	$800	$800	$410		$1,210
7834	REGIMENTAL HQ BLDG	9,904	Admin	1	$800	$800	$410		$1,210
7836	BN ADMIN & CLRM	12,246	Battalian	2	$800	$1,600	$410		$2,010
7842	ENL BARRACKS W/AS	41,843	Barracks	1	$800	$800	$364		$1,164
7844	ENL BARRACKS W/O DIN	41,843	Barracks	1	$800	$800	$364		$1,164
7846	ENL BARRACKS W/AS	41,843	Barracks	1	$800	$800	$364		$1,164
7848	ENL BARRACKS W/O DIN	41,843	Barracks	1	$800	$800	$364		$1,164
7850	ENL BARRACKS W/AS	41,843	Barracks	1	$800	$800	$364		$1,164
7852	ADMIN & SUPPLY BLDG	13,280	Admin & Supp	1	$800	$800	$364		$1,164
7854	BN HQ BLDG	13,493	Battalian	1	$800	$800	$364		$1,164
7856	ENL PERS DIN	13,493	Dining	1	$800	$800	$364		$1,164
7858	ADMIN & SUPPLY BLDG	13,280	Admin & Supp	1	$800	$800	$364		$1,164
7865	UNIT CHAPEL	8,718	Church	1	$800	$800	$298		$1,098
7866	THEATER W/DRESS RM	11,098	Theater	1	$800	$800	$410		$1,210
7900	VEH MNT SHOP ORG	20,943	Maintenance	1	$800	$800	$298		$1,098
7920	VEH MNT SHOP DS	124,553	Maintenance	4	$800	$3,200	$410		$3,610
7940	VEH MNT SHOP ORG	22,405	Maintenance	1	$800	$800	$410		$1,210
7960	VEH MNT SHOP ORG	20,245	Maintenance	1	$800	$800	$410		$1,210
8002	ENL BARRACKS W/O DIN	22,700	Barracks	1	$800	$800	$234		$1,034
8006	ENL BARRACKS W/O DIN	22,700	Barracks	1	$800	$800	$234		$1,034
8008	ENL BARRACKS W/O DIN	11,549	Barracks	1	$800	$800	$234		$1,034
8010	DET DAY ROOM	2,100	Admin	1	$800	$800	$234		$1,034
8012	ENL BARRACKS W/O DIN	22,700	Barracks	1	$800	$800	$234		$1,034

PROJECT: FEASIBILITY STUDY FOR INSTALLATION OF UMCS
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RCU / ACU / UCU COST

BLDG NO.	BLDG NAME	SQ FT	USE	NO. OF ACUs	COST per ACU	ACU COST	RCU COST	UCU COST	RCU/ACU/UCU COST TOTAL
8014	ENL BARRACKS W/O DIN	11,549	Barracks	1	$800	$800	$234		$1,034
8020	DET DAY ROOM	2,100	Admin	1	$800	$800	$234		$1,034
8021	ADMIN & SUPPLY BLDG	23,676	Admin & Supp	1	$800	$800	$234		$1,034
8023	ADMIN & SUPPLY BLDG	23,676	Admin & Supp	1	$800	$800	$234		$1,034
8025	BN ADMIN & CLRM	12,000	Battalian	2	$800	$1,600	$234		$1,834
8037	BN ADMIN & CLRM	12,000	Battalian	2	$800	$1,600	$328		$1,928
8038	ENL BARRACKS W/O DIN	22,700	Barracks	1	$800	$800	$328		$1,128
8040	ENL BARRACKS W/O DIN	11,549	Barracks	1	$800	$800	$328		$1,128
8042	ENL BARRACKS W/O DIN	22,700	Barracks	1	$800	$800	$328		$1,128
8044	APP INSTR BLDG	2,470	Training	1	$800	$800	$328		$1,128
8046	DET DAY ROOM	2,100	Admin	1	$800	$800	$328		$1,128
8048	ENL BARRACKS W/O DIN	11,549	Barracks	1	$800	$800	$328		$1,128
8050	ENL BARRACKS W/O DIN	11,549	Barracks	1	$800	$800	$328		$1,128
8052	SR ENL QTRS	22,700	Barracks	1	$800	$800	$328		$1,128
8054	ENL BARRACKS W/O DIN	11,549	Barracks	1	$800	$800	$328		$1,128
8056	DET DAY ROOM	2,100	Admin	1	$800	$800	$328		$1,128
8057	ADMIN & SUPPLY BLDG	23,676	Admin & Supp	1	$800	$800	$328		$1,128
8059	ADMIN & SUPPLY BLDG	23,676	Admin & Supp	1	$800	$800	$328		$1,128
8063	ENL PERS DIN	18,313	Dining	1	$800	$800	$234		$1,034
8065	CLINIC W/O BEDS	3,848	Clinic	1	$800	$800	$234		$1,034
8069	IN SW POOL/GYM	25,620	Swimming Pool	2	$800	$1,600	$234		$1,834
8071	RGT HQ BUILD	9,963	Admin	1	$800	$800	$234		$1,034
8100	CONSOLIDATED MNT	224,927	Maintenance	7	$800	$5,600	$3,280	$17,160	$26,040
8300	VEH MNT SHOP ORG	20,240	Maintenance	2	$800	$1,600	$410		$2,010
8320	VEH MNT SHOP ORG	20,240	Maintenance	2	$800	$1,600	$410		$2,010
8330	VEH MNT SHOP ORG	39,256	Maintenance	2	$800	$1,600	$410		$2,010
8340	VEH MNT SHOP ORG	20,240	Maintenance	2	$800	$1,600	$410		$2,010
8360	VEH MNT SHOP ORG	39,428	Maintenance	2	$800	$1,600	$410		$2,010
8370	VEH MNT SHOP ORG	26,876	Maintenance	2	$800	$1,600	$410		$2,010
8380	VEH MNT SHOP ORG	73,400	Maintenance	3	$800	$2,400	$364		$2,764
8390	TAC EQUIP SHOP	24,755	Maintenance	1	$800	$800	$273		$1,073
8410	VEH MNT SHOP ORG	73,233	Maintenance	4	$800	$3,200	$410		$3,610

E5
MANUFACTURERS' PRODUCT LITERATURE

ARNCO®

ARNCO CORPORATION
860 GARDEN STREET • ELYRIA, OH 44035
PHONE 216/322-1000 • FAX 216/323-7111

QUOTATION

Ref. No.: CLS0844
Date: 09/08/95
Project: EMC ENGINEERS
FORT RILEY

Attn: ALAN NIEMEYER
EMC ENGINEERS

PHONE: (303)988-2951
FAX: (303)985-2527

Reference: CLS0844
Required Date: 09/08/95
Bid Date:

Please refer to above reference number when placing an order based on this quote.

ITEM	QUANTITY	CATALOG NUMBER & PRODUCT DESCRIPTION	PRICE/UOM	AMOUNT
001	68.00 MFT	SI 511 100 N033 SPIRAL IN, SMOOTH OUT, TYPE-11, 1", HDPE, ORANGE. 10 X 6800' ON 78" REELS	$220.55 MFT	14997.40
002	2.00 CTN	IA 551 511 600 100 COUPLER, ALUM, 1" ID DUCT (10/CTN) FOR ABOVE DUCT PACKAGED 10 PER CARTON - ORDER BY THE CARTON — — — — — — — OR — — — — —	$69.12 CTN	138.24
003	68.00 MFT	SI 511 125 N033 SAME DUCT AS ABOVE -EXCEPT- 1.25" 14 X 4857' ON 78" REELS	$301.43 MFT	20497.24
004	3.00 CTN	IA 551 511 125 COUPLER, ALUM, 1.25"ID DUCT 10/CTN PACKAGED 10 PER CARTON -- ORDER BY THE CARTON	$85.13 CTN	255.39
005		- - OPTIONS - - ADD AS NEEDED...... PRELUBRICATION 1" DUCT $5./mft 1.25" DUCT $10./mft 1250# PULL TAPE $43.36/mft		

Terms: NET
F.O.B. Factory-Freight Terms: FRT ALLOWED TO DENVER, CO AREA
Estimated Delivery: APPROX 3-4 WKS TO SHIP A.R.O.

Please note changes to quantity, size, color, destination, put-ups, type, pull line, etc... may change price.

Thank you for the opportunity of providing this quotation. Your business is sincerely solicited, and we look forward to your order.

By: CHERYL SCHISLER

This quotation remains firm for 30 days. Quotation subject to the terms and conditions on the reverse side of this quotation unless otherwise specified in writing.
INNOVATIVE CABLE PLACEMENT PRODUCTS
QF REVISED 6/91

STARBURST® AND SMOOTHWALL POLYETHYLENE DUCT

This specification lists the design criteria for ARNCO polyethylene duct.

1.0 GENERAL

Depending upon the application, ARNCO duct is manufactured to comply with various industry standards and specifications.

1.1 Polyethylene Plastic duct shall conform to the following industry standards:

ASTM D2239 — Polyethylene plastic duct (SIDR-PR) sized by controlled inside diameter.

ASTM D3035 — Polyethylene plastic duct (SDR-PR) sized by controlled outside diameter.

ASTM D2247 — Standard specification for polyethylene plastic duct schedules 40 and 80 and sized by controlled outside diameter.

ASTM D1248 — Polyethylene plastics extrusions and molding materials.

1.2 ARNCO manufactures cable-in-duct in accordance with NEMA standards publication TC-7-1983, smoothwall coilable polyethylene electrical plastic duct. The duct is also made to ASTM D3485 standard specification for coilable polyethylene duct for pre-assembled wire and cable.

2.0 MATERIAL

ARNCO duct is manufactured from high density ultraviolet stabilized polyethylene resin.

2.1 The high density polyethylene used is consistent with PE334420E/C as described in ASTMD3350 (see Table 1).

2.2 ARNCO duct products are UV stabilized for protection during shipping and outside storage for a minimum rating of one-year shelf life. Enhanced UV stabilized products are available for aerial applications or applications that would call for extended sunlight and outdoor exposure.

2.3 Starburst FR and smoothwall flame retardant are also offered by ARNCO, and are recognized by Underwriter Laboratories to meet UL Test 94 with a V-O rating.

2.4 Starguard and smoothwall armored duct is corrugated steel reinforced for rodent protection and additional mechanical strength.

2.5 Starguard and smoothwall prelubricated duct is also manufactured by ARNCO. An even and permanent proprietary lubricant formulation is applied to the inside diameter during the manufacturing process.

2.6 The standard duct color is black. For identification, the duct is also manufactured with color stripes and/or various solid colors. Standard colors in addition to black are: orange, red, white, yellow and blue.

2.7 Starburst ribbed duct has internally and externally designed longitudinal ribs for reduced pulling frictions and increased lubrication effectiveness.

TABLE 1 — RESIN PROPERTIES

The resin properties shall meet or exceed the values set forth below for high density polyethylene (HDPE).

ASTM TEST	DESCRIPTION	VALUES HDPE
D-638	Tensile strength at yield psi	3200 min
D-638	% Ultimate Elongation value	400 min
D-746	Brittleness Temperature	−75°C max
D-256	Impact Resistance per inch of notch	3.4 ft lb/in
D-1238	Melt index, g/10 min Condition E	.4 max
D-1505	Density g/CM³	.941 - .959
D-1693	Environmental Stress Crack Resistance Condition B, F_{20}	48 hrs

860 GARDEN STREET • ELYRIA, OHIO 44035
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STARBURST® AND SMOOTHWALL POLYETHYLENE DUCT

Below are instructions for ordering and describing various types of ARNCO Starburst and Smoothwall duct.

1.0 GENERAL

This specification provides information for determining proper product codes when ordering ARNCO Starburst or Smoothwall duct. While this document will be updated as new products are developed it may not always be complete.

1.1 Consult our Trade price sheet for the most recent information for ordering. You may also contact our main sales office listed below or our local representative. A listing of sales representatives will be provided upon request.

2.0 ORDERING INFORMATION

So that we may accurately process your order for duct we will need to know your specific requirements. By following the steps listed below, you can determine the proper product identification number. We also recommend writing a complete description to confirm the part number.

2.1 The beginning catalog number can be found by referencing the dimensional specifications given on pages 3-6. That number will tell us what type and inside diameter sized duct you require.

2.2 Below is a checklist of items that you should consider when ordering duct.

1) Configuration such as Smoothwall, Starburst, Starburst Spiral Ribbed, smooth outside/ribbed inside, corrugated or armored.
2) Sizing Standards include SDR/ASTM, true, type, or schedules as set forth in the following pages.
3) Inside diameter of the duct.
4) Is the duct to be lubricated?
5) What resin type is required, such as HDPE, MDPE, UV stabilized or flame retardant.
6) Is the duct black, are color stripes or solid colors needed for identification purposes?
7) Is a pull/measure tape to be installed for use in the duct?
8) Are any special put-ups required, such as limitations to reel sizes? Is the duct to be paralleled or coiled or both?

Having the above information prepared when ordering or seeking a quotation is very important. This information will assure that you receive a prompt and accurate response.

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TEL: (800)321-7914 – FAX: 216/323-7111

TECHNICAL SPECIFICATIONS

ARNCO STARBURST & SMOOTHWALL POLYETHYLENE DUCT

EFFECTIVE: DECEMBER 1, 1993

CATALOG NUMBER	NOM SIZE	I.D.	I.D. TOL.+	I.D. TOL –	MIN. WALL	WALL TOL.+	O.D.	WT/FT	BEND RADIUS	TENSILE STRENGTH
SIDR 7 ASTM D2239										
SW 307 100	1"	1.049	0.010	0.020	0.150	0.020	1.369	0.250	12	1653
SW 307 125	1-1/4"	1.380	0.010	0.020	0.197	0.027	1.801	0.433	16	2862
SIDR 9 ASTM D2239										
SW 309 100	1"	1.049	0.010	0.020	0.117	0.020	1.303	0.193	12	1276
SW 309 118	1-1/8"	1.214	0.010	0.020	0.135	0.020	1.504	0.255	14	1684
SW 309 125	1-1/4"	1.380	0.010	0.020	0.153	0.020	1.706	0.325	16	2150
SW 309 138	1-3/8"	1.495	0.015	0.020	0.166	0.020	1.847	0.360	17	2514
SW 309 150	1-1/2"	1.610	0.015	0.020	0.179	0.020	1.988	0.439	18	2906
SW 309 200	2"	2.067	0.015	0.020	0.230	0.028	2.555	0.729	23	4820
SW 309 300	3"	3.068	0.015	0.030	0.341	0.038	3.788	1.594	34	10549
SIDR 11.5 ASTM D2239										
SW 311 100	1"	1.049	0.010	0.020	0.091	0.014	1.245	0.145	11	960
SW 311 118	1-1/8"	1.214	0.010	0.020	0.106	0.020	1.446	0.199	13	1318
SW 311 125	1-1/4"	1.380	0.010	0.020	0.120	0.020	1.640	0.254	15	1678
SW 311 138	1-3/8"	1.495	0.015	0.020	0.130	0.020	1.775	0.296	16	1956
SW 311 150	1-1/2"	1.610	0.015	0.020	0.140	0.020	1.910	0.341	17	2256
SW 311 200	2"	2.067	0.015	0.020	0.180	0.028	2.455	0.567	22	3749
SW 311 300	3"	3.068	0.015	0.030	0.267	0.032	3.634	1.225	33	8107
SIDR 15 ASTM D2239										
SW 315 050	1/2"	0.622	0.010	0.010	0.060	0.020	0.762	0.063	7	414
SW 315 075	3/4"	0.824	0.010	0.015	0.060	0.020	0.964	0.081	9	534
SW 315 100	1"	1.049	0.010	0.020	0.070	0.020	1.209	0.117	11	772
SW 315 125	1-1/4"	1.380	0.010	0.020	0.092	0.020	1.584	0.195	14	1292
SW 315 150	1-1/2"	1.610	0.015	0.020	0.107	0.020	1.844	0.261	17	1727
SW 315 200	2"	2.067	0.015	0.020	0.138	0.020	2.363	0.424	21	2802
TRUE SIZE 7 WALL										
SW 707 100	1"	1.020	0.020	0.020	0.143	0.020	1.326	0.232	12	1534
TRUE SIZE 9 WALL										
SW 709 100	1"	1.020	0.020	0.020	0.111	0.020	1.262	0.178	11	1180
SW 709 125	1-1/4"	1.270	0.020	0.020	0.139	0.020	1.568	0.273	14	1807
STARBURST TYPE 9 or STARBURST SPIRAL TYPE 9										
SB or SR 509 100	1"	1.020	0.010	0.020	0.098	0.014	1.230	0.169	11	1009
SB or SR 509 118	1-1/8"	1.145	0.010	0.020	0.113	0.020	1.391	0.218	13	1333
SB or SR 509 125	1-1/4"	1.270	0.010	0.020	0.125	0.020	1.540	0.261	14	1621
RI or SI 509 138	1-3/8"	1.395	0.015	0.020	0.140	0.020	1.695	0.316	15	1981
RI or SI 509 150	1-1/2"	1.520	0.015	0.020	0.155	0.020	1.850	0.375	17	2376
STARBURST TYPE 11 or STARBURST SPIRAL TYPE 11										
SB or SR 511 100	1"	1.020	0.010	0.020	0.083	0.014	1.200	0.145	11	854
SB or SR 511 118	1-1/8"	1.145	0.010	0.020	0.093	0.020	1.347	0.179	12	1075
SB or SR 511 125	1-1/4"	1.270	0.010	0.020	0.100	0.020	1.490	0.212	14	1297
RI or SI 511 150	1-1/2"	1.520	0.015	0.020	0.126	0.020	1.792	0.307	16	1925
RI or SI 611 200	2"	1.922	0.015	0.020	0.216	0.020	2.375	0.633	22	4160
STARBURST TYPE 13 or STARBURST SPIRAL TYPE 13										
RI or SI 513 200	2"	2.020	0.015	0.020	0.145	0.020	2.360	0.486	21	3182

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TECHNICAL SPECIFICATIONS

ARNCO STARBURST & SMOOTHWALL POLYETHYLENE DUCT

EFFECTIVE: DECEMBER 1, 1993

CATALOG NUMBER	NOM SIZE	O.D.	O.D. TOL.+	O.D. TOL –	MIN. WALL	WALL TOL.+	I.D.	WT/FT	BEND RADIUS	TENSILE STRENGTH

SDR 11 ASTM D3035

SW 611 013	13MM	0.625	0.012	0.012	0.062	0.007	0.494	0.047	6	313
SW 611 050	1/2"	0.840	0.012	0.012	0.076	0.020	0.668	0.084	8	554
SW 611 075	3/4"	1.050	0.012	0.012	0.095	0.020	0.840	0.128	10	848
SW 611 100	1"	1.315	0.012	0.012	0.119	0.020	1.057	0.198	12	1307
SW 611 125	1-1/4"	1.660	0.012	0.012	0.151	0.020	1.338	0.312	15	2063
SW 611 150	1-1/2"	1.900	0.012	0.012	0.173	0.020	1.534	0.406	17	2686
SW 611 200	2"	2.375	0.012	0.012	0.216	0.021	1.922	0.629	22	4160
SW 611 250	2-1/2"	2.875	0.012	0.012	0.261	0.031	2.322	0.928	26	6142
SW 611 300	3"	3.500	0.012	0.012	0.318	0.031	2.833	1.364	32	9027
SW 611 400	4"	4.500	0.012	0.012	0.409	0.031	3.651	2.235	41	14789

SDR 13.5 ASTM D3035

SW 613 050	1/2"	0.840	0.012	0.012	0.062	0.020	0.696	0.071	8	472
SW 613 075	3/4"	1.050	0.012	0.012	0.078	0.020	0.874	0.109	10	723
SW 613 100	1"	1.315	0.012	0.012	0.097	0.020	1.101	0.167	12	1104
SW 613 125	1-1/4"	1.660	0.012	0.012	0.123	0.020	1.394	0.262	15	1736
SW 613 150	1-1/2"	1.900	0.012	0.012	0.141	0.020	1.598	0.341	17	2257
SW 613 200	2"	2.375	0.012	0.012	0.176	0.021	2.002	0.527	22	3489
SW 613 250	2-1/2"	2.875	0.012	0.012	0.213	0.026	2.423	0.773	26	5117
SW 613 300	3"	3.500	0.012	0.012	0.259	0.031	2.951	1.144	32	7569
SW 613 400	4"	4.500	0.012	0.012	0.333	0.040	3.794	1.891	41	12514

SDR 15.5 ASTM D3035

SW 615 100	1"	1.315	0.012	0.012	0.085	0.020	1.125	0.150	12	990
SW 615 125	1-1/4"	1.660	0.012	0.012	0.107	0.020	1.426	0.233	15	1543
SW 615 150	1-1/2"	1.900	0.012	0.012	0.123	0.020	1.634	0.304	17	2009
SW 615 200	2"	2.375	0.012	0.012	0.153	0.020	2.049	0.466	22	3082
SW 615 250	2-1/2"	2.875	0.012	0.012	0.185	0.020	2.485	0.675	26	4467
SW 615 300	3"	3.500	0.012	0.012	0.226	0.020	3.028	0.995	32	6585
SW 615 400	4"	4.500	0.012	0.012	0.290	0.020	3.900	1.628	41	10771

SDR 17 ASTM D3035

SW 617 075	3/4"	1.050	0.012	0.012	0.062	0.020	0.906	0.091	10	601
SW 617 100	1"	1.315	0.012	0.012	0.077	0.020	1.141	0.138	12	913
SW 617 125	1-1/4"	1.660	0.012	0.012	0.098	0.020	1.444	0.217	15	1432
SW 617 150	1-1/2"	1.900	0.012	0.012	0.112	0.020	1.656	0.280	17	1854
SW 617 200	2"	2.375	0.012	0.012	0.140	0.020	2.075	0.431	22	2853
SW 617 250	2-1/2"	2.875	0.012	0.012	0.169	0.024	2.513	0.630	26	4168
SW 617 300	3"	3.500	0.012	0.012	0.206	0.025	3.063	0.926	32	6129

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TECHNICAL SPECIFICATIONS

ARNCO STARBURST & SMOOTHWALL POLYETHYLENE DUCT

EFFECTIVE: DECEMBER 1, 1993

CATALOG NUMBER	NOM SIZE	O.D.	O.D. TOL.+	O.D. TOL –	MIN. WALL	WALL TOL.+	I.D.	WT/FT	BEND RADIUS	TENSILE STRENGTH
STANDARD WALL ASTM D3485 & NEMA TC-7										
SW 685 050	1/2"	0.840	0.012	0.012	0.060	0.020	0.700	0.070	8	460
SW 685 075	3/4"	1.050	0.012	0.012	0.060	0.020	0.910	0.089	10	586
SW 685 100	1"	1.315	0.012	0.012	0.075	0.020	1.145	0.135	12	893
SW 685 125	1-1/4"	1.660	0.012	0.012	0.100	0.020	1.440	0.220	15	1457
SW 685 150	1-1/2"	1.900	0.012	0.012	0.115	0.020	1.650	0.287	17	1896
SW 685 200	2"	2.375	0.012	0.012	0.145	0.020	2.065	0.445	22	2941
SW 685 250	2-1/2"	2.875	0.012	0.012	0.203	0.020	2.449	0.733	26	4847
SW 685 300	3"	3.500	0.012	0.012	0.216	0.020	3.048	0.956	32	6325
SW 685 400	4"	4.500	0.012	0.012	0.240	0.020	4.000	1.373	41	9082
SCHEDULE 40 ASTM D2447										
SW 400 050	1/2"	0.840	0.012	0.012	0.109	0.020	0.602	0.111	8	733
SW 400 075	3/4"	1.050	0.012	0.012	0.113	0.020	0.804	0.147	10	974
SW 400 100	1"	1.315	0.012	0.012	0.133	0.020	1.029	0.217	12	1432
SW 400 125	1-1/4"	1.660	0.012	0.012	0.140	0.020	1.360	0.293	15	1936
SW 400 150	1-1/2"	1.900	0.012	0.012	0.145	0.020	1.590	0.349	17	2312
SW 400 200	2"	2.375	0.012	0.012	0.154	0.020	2.047	0.468	22	3099
SW 400 250	2-1/2"	2.875	0.012	0.012	0.203	0.024	2.445	0.739	26	4888
SW 400 300	3"	3.500	0.012	0.012	0.216	0.026	3.042	0.968	32	6403
SW 400 350	3-1/2"	4.000	0.012	0.012	0.226	0.027	3.521	1.164	36	7699
SW 400 400	4"	4.500	0.012	0.012	0.237	0.028	3.998	1.378	41	9117
SCHEDULE 80 ASTM D2447										
SW 800 050	1/2"	0.840	0.012	0.012	0.147	0.020	0.526	0.139	8	916
SW 800 075	3/4"	1.050	0.012	0.012	0.154	0.020	0.722	0.188	10	1242
SW 800 100	1"	1.315	0.012	0.012	0.179	0.021	0.936	0.276	12	1823
SW 800 125	1-1/4"	1.660	0.012	0.012	0.191	0.023	1.255	0.381	15	2523
SW 800 150	1-1/2"	1.900	0.012	0.012	0.200	0.024	1.476	0.462	17	3059
SW 800 200	2"	2.375	0.012	0.012	0.218	0.026	1.913	0.640	22	4233
SW 800 250	2-1/2"	2.875	0.012	0.012	0.276	0.033	2.290	0.976	26	6457
SW 800 300	3"	3.500	0.012	0.012	0.300	0.036	2.864	1.307	32	8650
SW 800 350	3-1/2"	4.000	0.012	0.012	0.318	0.038	3.326	1.595	36	10552
SW 800 400	4"	4.500	0.016	0.016	0.337	0.040	3.786	1.911	41	12643

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CONTROL RELAYS

Model		Type	Contact Rating	List	Code
RH1B-UAC	24 V	SPDT	10 AMP	14.75	B
RH1B-UAC	120 V	SPDT	10 AMP	14.75	B
RH1B-UDC	24 V	SPDT	10 AMP	13.42	B
RH2B-UAC	24 V	DPDT	10 AMP	15.72	(6.32) B = 5.6
RH2B-UAC	120 V	DPDT	10 AMP	15.72	(6.36) B = 5.
RH2B-UDC	24 V	DPDT	10 AMP	14.92	B
RH2LB-UDC	12 V	DPDT-LATCHING	10 AMP	41.11	B
RH2LB-UDC	24 V	DPDT-LATCHING	10 AMP	41.11	B
RH3B-UAC	24 V	3PDT	10 AMP	19.44	B
RH3B-UAC	120 V	3PDT	10 AMP	19.44	B
RH3B-UDC	24 V	3PDT	10 AMP	18.56	B
RH4B-UAC	24 V	4PDT	10 AMP	23.81	B
RH4B-UAC	120 V	4PDT	10 AMP	23.81	B
RH4B-UDC	24 V	4PDT	10 AMP	23.08	B
*(L) SUFFIX		LIGHT		4.11	B
*(C) SUFFIX		CHECK BUTTON		2.06	B

*Not available with Single Pole Relays

HEAVY DUTY CONTROL RELAYS

RRR2P-UAC	24 V	DPDT	10 AMP	24.78	B
RR2P-UAC	120 V	DPDT	10 AMP	24.78	B
RR2P-UDC	24 V	DPDT	10 AMP	23.22	B
RR3PA-UAC	24 V	3PDT	10 AMP	29.69	B
RR3PA-UAC	120 V	3PDT	10 AMP	29.69	B
RR3PA-UDC	24 V	3PDT	10 AMP	29.06	B
(L) SUFFIX		LIGHT		4.11	B
(C) SUFFIX		CHECK BUTTON		2.06	B

CONTROL RELAY SOCKETS

Model	Type	List	Code
SH1B-05	SPDT-RH RELAY SOCKET	8.22 = 2.90	B
SH2B-05	DPDT-RH RELAY SOCKET	10.06 = 3.62	B
SH3B-05	3PDT-RH RELAY SOCKET	11.03	B
SH4B-05	4PDT-RH RELAY SOCKET	14.39	B
SR2P-06	DPDT-RR RELAY SOCKET	8.22	B
SR3P-06	3PDT-RR RELAY SOCKET	11.03	B

MOUNTING TRACK

BAM-1000	39" RAIL, ALUMINUM	11.28	B
DIN-3F	1 METER, STEEL	11.81	B

RELAY IN A BOX

Model	Description	Rating	List	Code
RIBU1C	SPDT (MINI-RIB)	10 AMP	37.44	B
RIBU2C	2-SPDT	10 AMP	63.94	B
RIBU1S	SPDT W/HOA	10 AMP	45.56	B
RIBU2S	2-SPDT W/ 1-HOA	10 AMP	71.95	B
RIBU2S2	2-SPDT W/ 2-HOA	10 AMP	80.00	B
RIB24P	DPDT	20 AMP	71.67	B

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6 HUMIDITY

HUMIDITY SENSORS

Model	Description	Manuf.	Range	Output	Accuracy	List	Code
LCH-R	SPACE/ OFFICE	RE TECH	10-90%	4-20 mA	±5%	249.61	A
HW10K*	SPACE / EXECUTIVE DECORATOR	RE TECH	0-100%	4-20 mA	±3%	355.56	A
HD10K	DUCT & OUTSIDE AIR	RE TECH	0-100%	4-20 mA	±3%	383.34	A
EL3K	REPLACEABLE ELEMENT FOR HD10K, HW10K	RE TECH				208.34	A
HW20K	SPACE / EXECUTIVE DECORATOR	RE TECH	0-100%	4-20 mA	±2%	430.56	A
HD20K	DUCT	RE TECH	0-100%	4-20 mA	±2%	497.23	A
HO20K	OUTSIDE AIR	RE TECH	0-100%	4-20 mA	±2%	505.56	A
HMD20U	DUCT & OUTSIDE AIR	VAISALA	0-100%	4-20 mA	±2%	775.01	A
HMD30U	DUCT & OUTSIDE AIR	VAISALA	0-100%	0-5 VDC	±2%	972.23	A
WMK-20	OSA SUN SHIELD AND MOUNTING KIT FOR HD10K & HMD20U & HMD30U	VAISALA				41.67	A
HMW20U	ROOM	VAISALA	0-100%	4-20 mA	±2%	658.34	A
HMW30U	ROOM	VAISALA	0-100%	0-5 VDC	±2%	811.12	A
HMK20	HUMIDITY CALIBRATOR	VAISALA	0-100%	Visual	±2%	2291.69	A
HM34	PORTABLE HUMIDITY METER	VAISALA	0-100%	Visual	±2%	1097.23	B
CT-829-A-MH	ROOM	HY-CAL	0-90%	4-20 mA	±2%	450.00	A (0.5) = 225.
CT-829-H19-X20	DUCT	HY-CAL	0-90%	4-20 mA	±2%	486.12	A (0.5) = 243.
CT-829-H19-X21	DUCT & OUTSIDE AIR	HY-CAL	0-90%	4-20 mA	±2%	486.12	A
CT-880-C	EXPL. PROOF TRANSMITTER	HY-CAL	0-100%	4-20 mA	±2.5%	2555.58	A
SA-728-A	LOOP-POWERED METER	HY-CAL	0-100%	Visual		763.90	B
A21	ASPIRATED SENSOR HOUSING					277.78	B
T0*	THERMISTOR TEMPERATURE SENSOR OPTION					26.39	A
XMH**	MEMBRANE (PUSH BUTTON)					22.22	A

* Thermistor Temperature Sensor Option (see catalog for available curves)

** Membrane override push button option for HW20K only

HUMIDISTATS

Model	Description	Manuf.	Range	List	Code
W43A-14	ROOM	JOHNSON	0-70%	110.92	C
HC-101	ROOM	BARBER-COLMAN	10-90%	149.00	C
HC-201	DUCT	BARBER-COLMAN	15-95%	149.00	C

DEWPOINT SENSOR

Model	Description	Manuf.	Output	List	Code
DP-3	DEWPOINT	GENERAL EASTERN	4-20 mA	2152.80	A

ENTHALPY / WET BULB SENSOR

Model	Description	List	Code
EWB	ENTHALPY-WET BULB ASPIRATED ENCLOSURE (NO SENSOR)	1097.23	A
ST-EWB-91-XP(1)	1,000 ohm .00375 PLATINUM RTD MATCHED SENSORS WET OR DRY BULB SENSOR	106.81	A
T91U-5	4-20 mA TRANSMITTER 30 to 110°F ±.4°F	122.22	A
ST-EWB-3-XP(1)	4" THERMISTOR 30 to 200°F ±.4°F MATCHED SENSORS WET OR DRY BULB SENSOR	81.81	A
J-6317-50	5 GALLON TRANSLUCENT DISTILLED WATER RESERVOIR	20.83	A
CLS	INTAKE FILTER WITH DISPOSABLE ELEMENT	188.89	A

(1) In pairs only – price is per sensor

All purchases are subject to Kele & Associates standard terms of sale.
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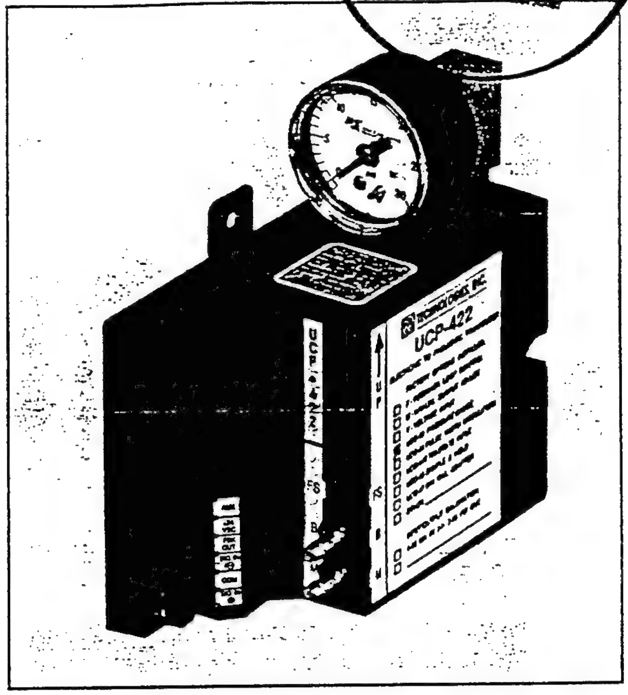
SPECIAL SAVINGS!

Loop Powered Pneumatic Transducer

UCP-422 Transducer Requires Less Space and Offers Greater Flexibility and Expandability



UCP-422 Universal Electronic / Pneumatic Transducers provide low cost pneumatic control of valves, dampers or other pneumatic devices. The **UCP-422** is a totally enclosed transducer with provisions for optional DIN rail mounting or surface mounting in two planes. When DIN rail mounting is used, this compact controller requires only 2"W x 4"H mounting area, providing efficient use of panel space.

The **UCP-422** accepts a 4-20 mA signal and outputs 3-15 psig (0.207-1.03 bar). Used in its base configuration, it requires no power supply for controlling pneumatic devices.

FEATURES

- *Low cost*
- *"Slim-line" mounting (saves panel space)*
- *Quick-disconnect terminals*
- *Loop-powered control (standard)*
- *No external filter required*
- *Excellent linearity*
- *High air capacity*
- *No calibration required*

OPTIONS

- *DIN rail mounting*
- *Pressure gauge*
- *PWM input*
- *Tri-state input*
- *Feedback*
- *Failsafe*
- *Manual-output adjustment*

ANY QUANTITY CAN BE PURCHASED AT THE 50+ PRICE SHOWN BELOW

			DEALER			
MODEL	DESCRIPTION	LIST	1-5	6-24	25-49	50+
UCP-422	4-20 mA to 3-15 PSI Pneumatic Output Transducer	175.00	63.00	61.00	59.00	57.00
OPTIONS						
UCO-42	Failsafe	116.11	41.80	39.50	38.00	37.00
UCO-43	Pressure Gauge	27.50	9.90	9.40	8.90	8.65
UCO-44	Pulse Width Input	150.00	54.00	50.00	49.00	48.00
UCO-44T	Tri-State Input	194.45	70.00	68.00	66.00	64.00
UCO-47	DIN Rail Mounting Adapter	6.11	2.20	2.20	2.20	1.95
"F" Option	Feedback	163.89	59.00	58.00	57.00	55.00
"M" Option	Manual Override	30.56	11.00	10.00	9.00	8.50
"V" Option	Voltage Input	36.11	13.00	12.00	11.50	10.50

PRICES GOOD THROUGH 3/15/95

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1000 OHM PLATINUM ROOM TEMPERATURE TRANSMITTER

MODEL ST-T91E

DESCRIPTION

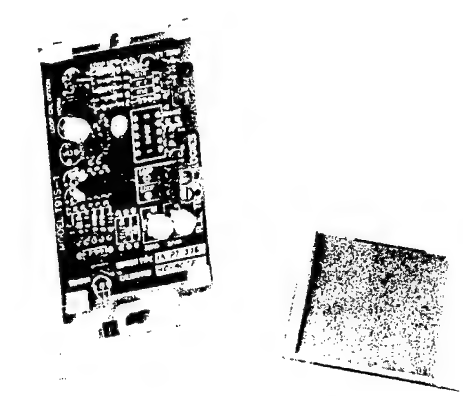
The **ST-T91E 1000 Ω Room Temperature Transmitter** provides stable, accurate room sensing for temperature control and Building Automation Systems.

The vented housing is made of a durable plastic with a tan enameled aluminum faceplate. This attractive enclosure mounts easily.

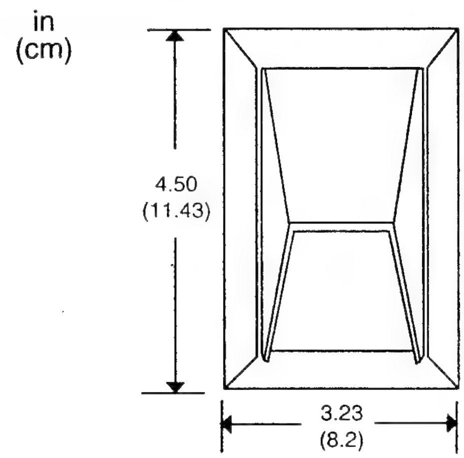
The **ST-T91E** has a loop-powered 4-20 mA output. The standard temperature range is 40° to 90°F (4° to 32°C), although other ranges are available upon request.

A special 20 mA loop calibration test signal provides easy system verification. Simply move the bottle plug jumper from NORM to 20 and the transmitter will output a constant 20 mA. The Loop Up LED provides power indication for the 4-20 mA output.

Override option: The **XME Option** is a normally open membrane momentary switch typically used to provide an override signal back to the controller input. When this switch is made, the 4-20 mA output signal goes to 3 mA until released.



DIMENSIONS



FEATURES

- ***High accuracy***
- ***No-drift platinum***
- ***Loop calibration test signal***
- ***Low cost***
- ***Decorative enclosure***
- ***Loop power LED indication***
- ***Membrane override switch (optional)***

SPECIFICATIONS

Sensing element	1000 Ω thin film platinum TCR 0.00375 Ω/Ω/°C	**Supply voltage**	10.5 VDC - 45 VDC
Ice point resistance	1000 ±2 Ω (±0.2%)	**Max impedance**	250 Ω at 15.5 VDC 500 Ω at 20.5 VDC 675 Ω at 24 VDC
Interchangeability	±0.5°C or 0.8% of temp at ±0.2% R_0 trim	**Temp operating range**	0° to 140°F (-18° to 60°C)
Configuration	Two-wire, loop-powered	**Temp effect**	0.015% span/°F
Output	4-20 mA	**Humidity**	0-95% noncondensing
Output limit	25 mA (sensor leads open)	**Transmitter accuracy**	0.2% of span
Loop calibration output	20 mA ±0.1%	**Sensor accuracy**	±0.2% of 1000 Ω at 0°C

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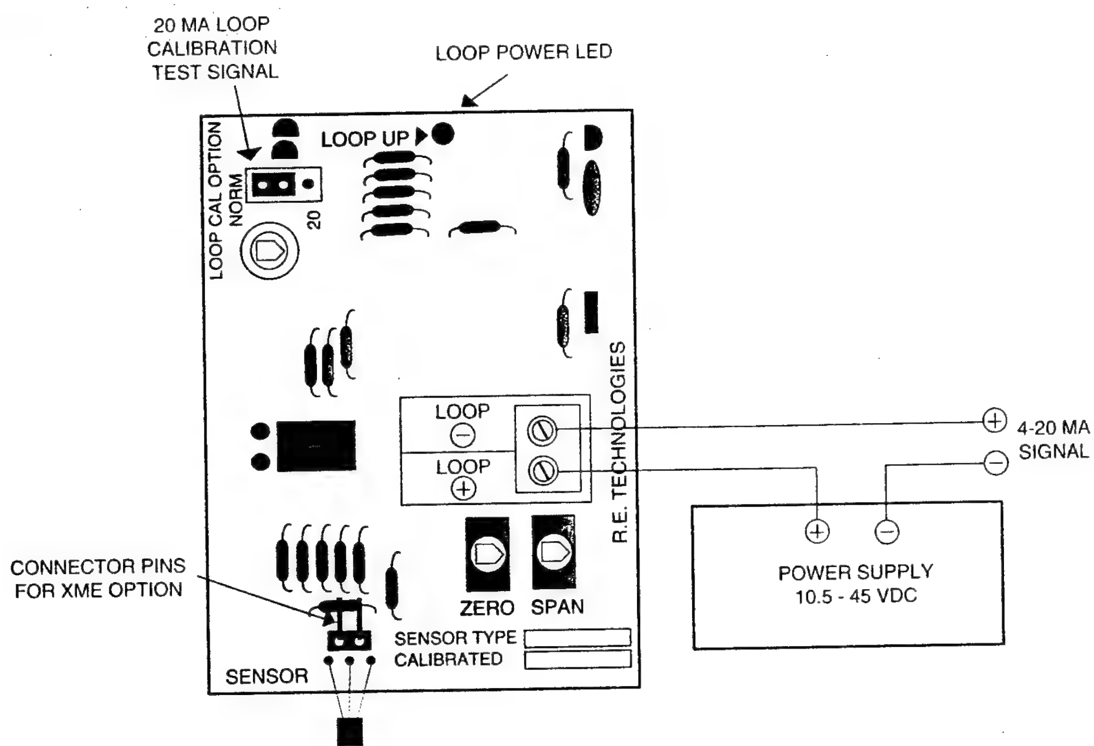
1000 OHM PLATINUM ROOM TEMPERATURE TRANSMITTER

MODEL ST-T91E

WIRING



ORDERING INFORMATION

MODEL	DESCRIPTION
ST-T91E	4-20 mA Room Temperature Transmitter with 1000 ohm platinum RTD

OPTIONS	
XGR	Gray Decorator Faceplate
XK	Customization (special range, logo, or feature)
XME	Membrane Override Switch (tan faceplate standard)

Example: **ST-T91E-XME** (40° to 90°F, 4° to 32°C) Temperature Transmitter with Membrane Override Switch

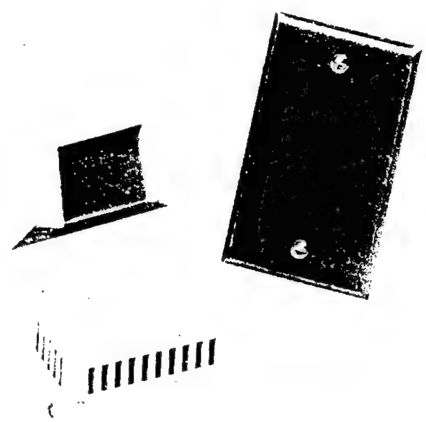
ST-T91E — XME

1000 OHM PLATINUM SPACE SENSORS

MODELS ST-S91, ST-S91E, ST-S91P

DESCRIPTION

The **Type 91 Space Temperature Sensors** provide stable, accurate room sensing for temperature control and Building Automation Systems. The room sensors feature: a stainless steel insulated plate; a standard plastic ventilated enclosure; and a deluxe executive enclosure design. The stainless steel plate is ideal for areas of vandalism or where the sensor can be easily knocked off the wall. The sensors are designed for interior use only in the temperature range of 0° to 140°F (-18° to 60°C).



SPECIFICATIONS

Sensing element	1000 Ω thin film platinum TCR 0.00375 Ω/Ω/°C
Sensor accuracy	±0.2% of 1000 Ω at 32°F (0°C)
Ice point resistance	1000 ohms ±2 Ω (±0.2%)
Interchangeability	±0.5°C or 0.8% of temp at ±0.2% R_0 trim
Temp range	0° to 140°F (-18° to 60°C)

ORDERING INFORMATION

MODEL	DESCRIPTION	
ST-S91	Surface Mount 1000 Ohm Thin Film Platinum Room Sensor	
	ENCLOSURES	
	P	Plastic Ventilated Room Enclosure
	E	Executive Style Room Enclosure
	-	Stainless Steel Plate

ST-S91 P

Example: **ST-S91P** Surface Mount 1000 Ohm 375 Platinum Room Sensor with Plastic Ventilated Room Enclosure

Related Product

T91U **Rangeable 4-20 mA Temperature Transmitter**

1

PLATINUM CURVE AVERAGING SENSORS

MODEL ST-AV91

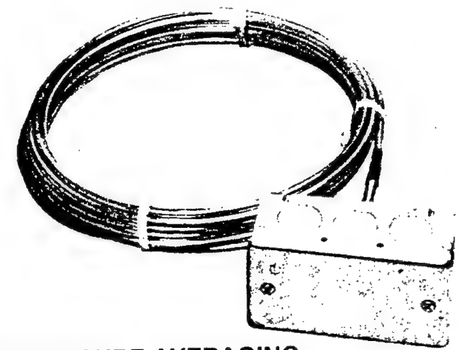
DESCRIPTION

Bendable Area Averaging Sensors

These continuous resistance element **Averaging Sensors** provide accurate sensing of duct temperatures when a large area must be covered. They average temperatures over their entire lengths thus avoiding point measurement errors.

The **Averaging Sensors** use an element that closely matches platinum resistance/temperature characteristics over the specified range of -30° to 240°F (-34° to 116°C).

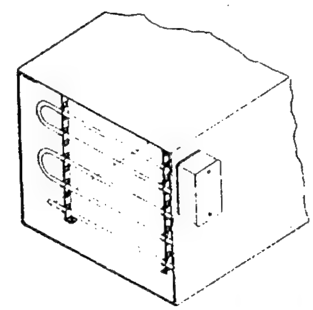
The sensors have a copper case which is bendable to a radius of 4". They can crisscross a duct or plenum to average out temperature stratification in both directions.



TEMPERATURE AVERAGING SENSOR

SPECIFICATIONS

Sensor	1000 ohms @ ±0.25% at 32°F (0°C) TCR 0.00375 Ω/Ω/°C
Probe material	Copper
Length	20 ft (6.1 meters)
Temp range	-30° to 240°F (-34° to 116°C)



TYPICAL APPLICATION

ORDERING INFORMATION

ST-AV91	**Averaging Duct Sensor 1000 ohm 375 platinum, 20 ft long**

Related Product

T91U	**Rangeable 4-20 mA Temperature Transmitter**

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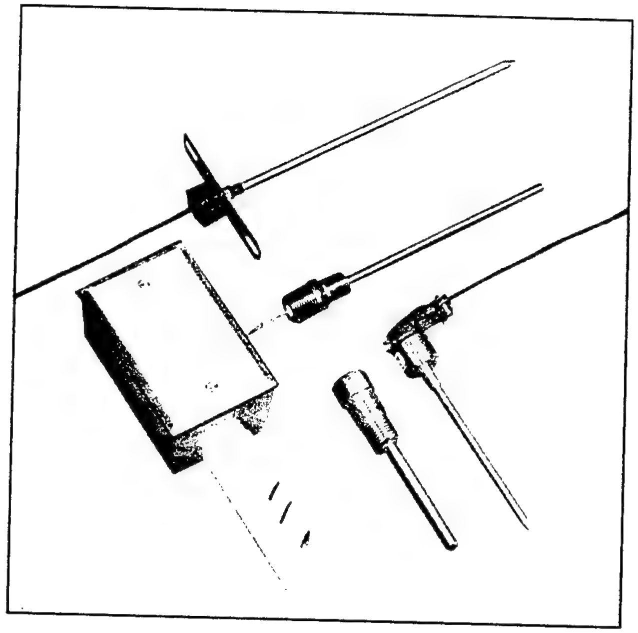
1000 OHM PLATINUM RTD SENSORS

ST-A91, ST-D91, ST-O91, ST-R91S, ST-W91

DESCRIPTION

The **Type 91** temperature sensors utilize a 1000 Ω thin film platinum resistance element. These sensors provide stable, accurate measurement for temperature control and Building Automation Systems, using standard 304 stainless steel probes.



The ***Immersion Sensor*** comes with a standard brass or optional stainless steel thermowell.

The ***Duct Sensor*** has mounting tabs for direct mounting on a duct or installation in a handibox.

The ***Outdoor Sensor*** is equipped with a sun shield and weatherproof box for mounting under the eaves or some other sheltered area. It is rated for outdoor applications.

The ***Strap-on Sensor*** is suitable for direct application to pipe surfaces for chilled and hot water applications.

The ***All Purpose Sensor*** can be used in any of the above applications.

All of the above sensors are available with an optional 4-20 mA transmitter output. See the T91U Transmitter in this section of the Kele catalog.

FEATURES

- ***High accuracy***
- ***No-drift platinum***
- ***Interchangeability***
- ***Low cost***

SPECIFICATIONS

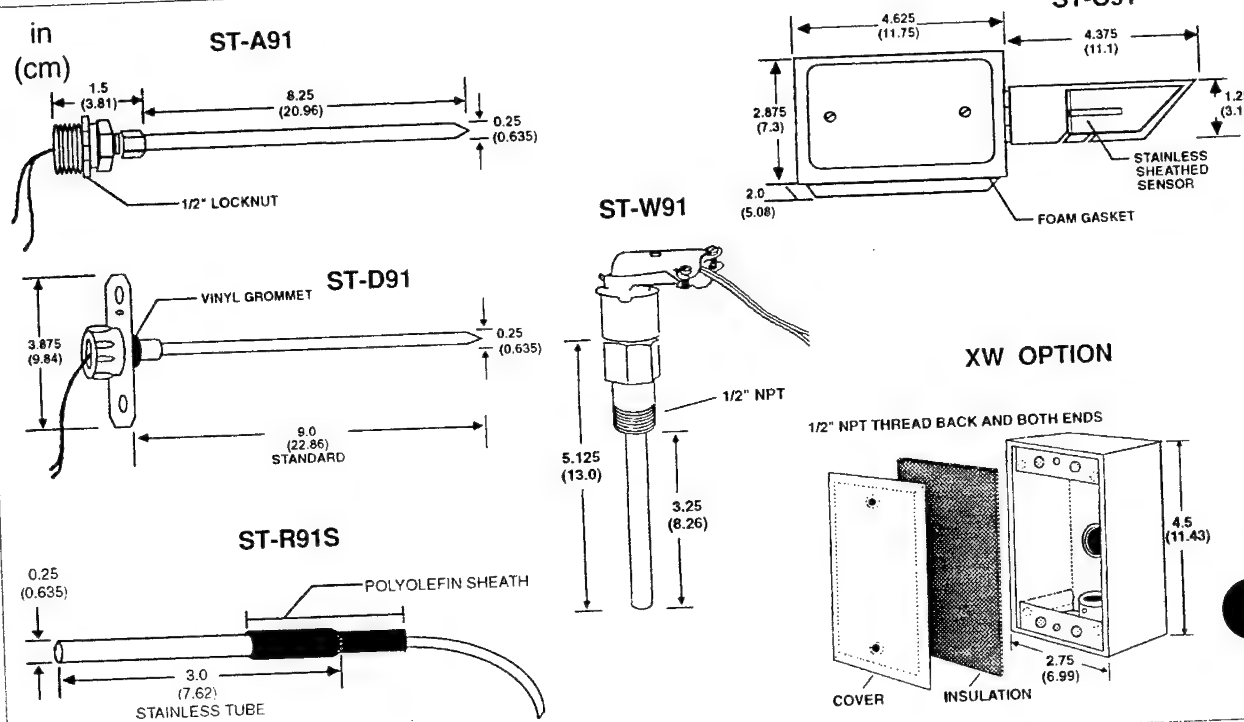
Sensing element	1000 Ω thin film platinum TCR 0.00375 Ω/Ω/°C	**Long term stability**	<0.05°C (0.2 Ω) per 5 years in air environments
Ice point resistance	1000 Ω ±2 Ω (±0.2%)	**Recommended current**	1 mA max in still air for <0.3°C (0.5°F) self-heating
Interchangeability	±0.5°C at 0.8% of temperature at ±0.2% R_0 trim		
Sensing element temp range	-67° to 302°F (-55° to 150°C)		

1

1000 OHM PLATINUM RTD SENSORS

ST-A91, ST-D91, ST-O91, ST-R91S, ST-W91

DIMENSIONS



ORDERING INFORMATION

MODEL	DESCRIPTION
ST-A91	All Purpose Sensor
ST-D91	Duct Sensor
ST-O91	Outdoor Air Sensor
ST-R91S	Strap-on Sensor
ST-W91	Immersion Sensor with Brass Thermowell

E	Immersion Sensor Without Well
S	Stainless Steel Thermowell for Immersion Only

OPTIONS	
XH	Handibox Housing **(ST-A91, -D91, -W91** only)
XW	Weatherproof Housing **(ST-A91,-D91,-W91** only)

ST-W91 ☐ — XW

Example: **ST-W91-XW** Immersion Sensor with brass well and weatherproof housing option

Related Product: T91U 4-20 mA Temperature Transmitters

1000 OHM PLATINUM RTD TRANSMITTER

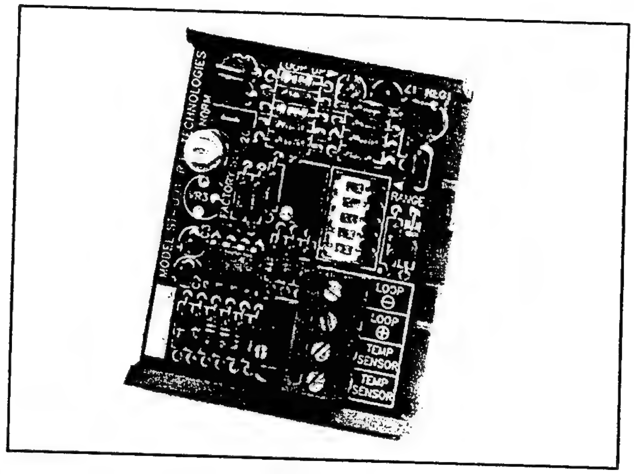
MODEL T91U

DESCRIPTION

The **T91U** is a rangeable two-wire, 4-20 mA RTD transmitter designed for use with **Type 91** 1000 Ω Platinum RTD Sensors. The transmitter is available in three standard ranges, or can be set for any range between -30° to 250°F (-34° to 121°C) with a minimum span of 40°F (22°C).

To range the **T91U**, set the DIP switches to match your selected range and use the zero and span pots to fine tune your adjustment. (High accuracy digital ohmmeter and decade box required.)

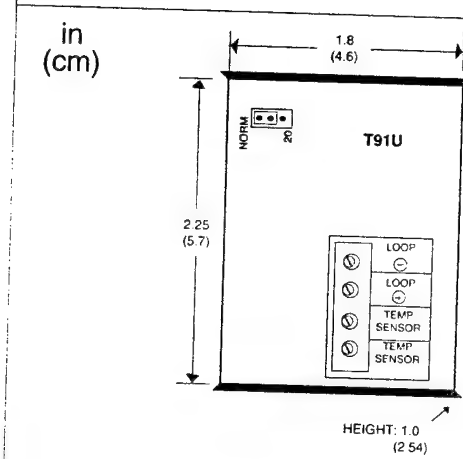
The **T91U** has a special 20 mA loop calibration test signal to provide easy system verification. Simply move the bottle plug jumper from NORM to 20 and the transmitter will output a constant 20 mA. The Loop Up LED provides power indication for the 4-20 mA output.



FEATURES

- ***Switch-set rangeable***
- ***Loop calibration test signal***
- ***Low cost***
- ***Snap-track mounting***
- ***Loop power LED indication***

DIMENSIONS



SPECIFICATIONS

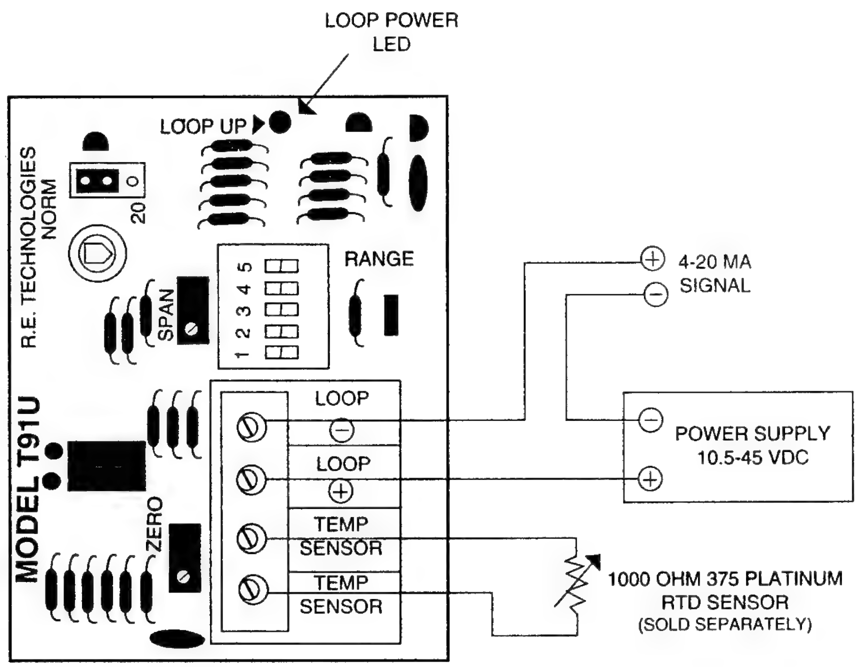
Sensor input	1000 Ω thin film platinum TCR 0.00375 Ω/Ω/°C	**Max impedance**	250 Ω at 15.5 VDC 500 Ω at 20.5 VDC 675 Ω at 24 VDC
Configuration	Two-wire, loop-powered	**Ambient temp**	0° to 140°F (-18° to 60°C)
Rangeability	-30° to 250°F (-34° to 121°C) Minimum span of 40°F (22°C)	**Humidity**	0-95% noncondensing
Output	4-20 mA	**Temp effect**	0.015% span/°F
Output limit	25 mA (sensor leads open)	**Accuracy**	0.1°F or 0.2% of span
Loop calibration output	20 mA ±0.1%	**RTD current**	0.65 mA
Supply voltage	10.5 VDC-45 VDC	**Dimensions**	1.8"W x 2.25"L x 1"H (4.6 cm x 5.7 cm x 2.5 cm)

1

1000 OHM PLATINUM RTD TRANSMITTER

MODEL T91U

WIRING



ORDERING INFORMATION

MODEL	DESCRIPTION
T91U	4-20 mA Rangeable RTD Transmitter

RANGE	
2	-20° to 140°F (-29° to 60°C)
3	0° to 100°F (-18° to 38°C)
4	30° to 240°F (-1° to 116°C)
XK	Special range

SENSOR TYPE	
—	Transmitter only
D	**ST-D91-XW** Duct Sensor (premounted and wired)
O	**ST-O91** Outside Air Sensor (premounted and wired)
W	**ST-W91-XW** Immersion Sensor (premounted and wired)

T91U — 2 — D

Example: **T91U-2-D** Transmitter with range of -20° to 140°F (-29° to 60°C) premounted and wired in duct sensor enclosure

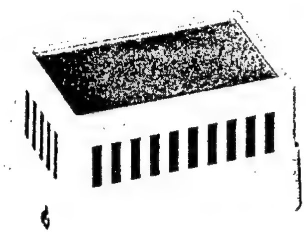
2

5% ROOM HUMIDITY TRANSMITTER

MODEL LCH-R

DESCRIPTION

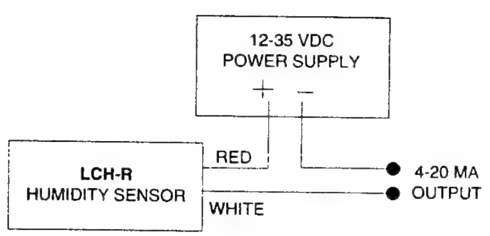
The **LCH-R** is a low cost **General Purpose Wall Mount Room Humidity Transmitter** that utilizes capacitance technology. Its wide range and good accuracy make it an ideal humidity transmitter for locations where ±5% relative humidity readings are required. The sensor is designed for indoor applications where relatively stable temperature conditions exist. The sensor should not be exposed to vapors such as acetone that attack plastics.



FEATURES

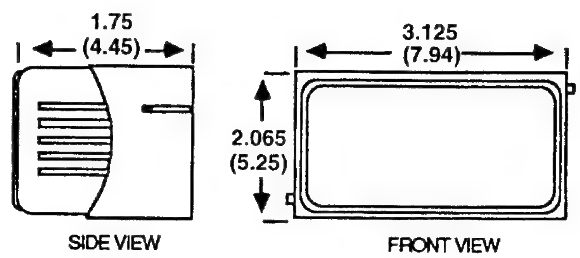
- *Fast response*
- *Accuracy ±5%*
- *Humidity span 10 to 90%*
- *Other output signals available*
- *Highly stable*
- *One-year warranty*

WIRING



DIMENSIONS

in
(cm)



SPECIFICATIONS

Range	0-100%	**Transmitter output**	4-20 mA DC two-wire, (0-100%)
Accuracy	±5% (10-90% RH)	**Power requirement**	Standard 12-35 VDC
Linearity	±3%	**RFI susceptibility**	Good RFI rejection to normal operating conditions
Hysteresis	< 3% (10 to 90% RH)	**Max external load with standard DC power 4-20 mA unit**	250 ohms ±0.1% @ 12 VDC loop voltage, 500 ohms ±0.1% 24 VDC loop voltage
Temp dependence	0.2% RH per degree C	**Input voltage effect**	±0.005% RH/volt from 8.7V to 45V
Response time (no filter)	10 seconds going from 90% to 10% RH		
Operating temp	-4° to 140°F (-20° to 60°C), 0 to 100% RH, noncondensing		
Storage temp	21° to 158°F (-20° to 70°C), 0 to 100% RH, noncondensing		

ORDERING INFORMATION

LCH-R	**RH Space Humidity Transmitter, 4-20 mA output**

Other outputs available upon request (nonstock).

CURRENT OPERATED SWITCHES

D150 / SD150 SERIES

USE THIS DEVICE TO MONITOR AC CURRENTS AND TO SWITCH DC CIRCUITS

DESCRIPTION

The **D150** or **SD150** is a **Solid-state DC Switch** which operates when the current level sensed by the internal current transformer exceeds the threshold values set by the four-turn adjustment. Three selectable ranges offer optimum adjustability and resolution. Internal circuits are totally powered by induction from the line being monitored. The **SD150** split-style allows easier installation over existing cables. The new, SMART LED with no off-state leakage current is standard on the **SD150.**

The **D150 / SD150** is recommended for relatively fixed loads where reliable ON/OFF indication or control is needed at lowest cost. See the **Model PD75** for monitoring loads which may vary slowly about the setpoint and where high-speed precision switching is required.

SD150 *D150*

FEATURES

- *Self-powered*
- *Small size*
- *Simple adjustment*
- *UL listed, file #E129625*
- *Solid-state reliability*
- *Wide current range*
- *Low cost*
- *CSA certified, file #LR-92007*
- *New SMART LED has no off-state leakage (SD-150)*
- *Monitor 1-200 amps*
- *Switch 150 mA continuous 30 VDC*
- *5-yr unconditional warranty*

APPLICATION

- *Direct connection to PLC and DDC inputs, for general status and proof-of-performance monitoring*
- *Directly control light DC loads, such as lamps and relays, in response to the current of a monitored AC circuit*
- *Replace differential pressure and air flow switches*
- *Safety and alarm circuits*
- *Monitor motors for status or broken belts and couplings*
- *Heat tracing, heater monitoring*

SPECIFICATIONS

Operating temperature	-58° to 149°F (-50° to 65°C)
Case	ABS (meets UL flammability rating 94V-O)
Insulation class	600V
Off state leakage	**D150-1NC-A-NL**: 0.25 mA **D150-3A**: 0.25 mA (N.C. only)
Switching capability (uses NPN type open collector transistors)	Up to 150 mA continuous, 500 mA momentary; 30 VDC max. Voltage across closed switch is 0.8V max for N.O. and 1.6V max for N.C.
-C Option	Uses bi-polar transistor that reduces on-state voltage drop to< 0.2V. Switching capability < 5 mA
Voltage across closed switch	1.5V max

D150 DIMENSIONS	
Overall unit	2.125"H x 2.125"W x 1.0"D (5.4 cm x 5.4 cm x 2.54 cm)
Mounting base	3.25" long (8.26 cm) integral
Mounting centers	2.75" (6.99 cm) For alternate mounting, holes are provided on one side for #6 screws.
Through-hole	0.55" diameter, for up to#2/0 insulated wire THHN,THWN type insulation).
SD150 DIMENSIONS	
Overall unit	2.5"H x 2.6"W x 1.2"D (6.4 cm x 6.6 cm x 3.05 cm)
Mounting base	3.5" long (8.9 cm) integral
Mounting centers	3.0" (7.62 cm)
Through-hole	0.85" square opening, for up to #4/0 cable or larger, depending on insulation.

CURRENT OPERATED SWITCHES

D150 / SD150 SERIES

3

MONITORED AC CURRENT (AMPS)

Input Range	Jumper	Max Continuous	6 sec	1 sec
D150: 1-6 Amperes **SD150**: 1.5-6 Amperes	none	**D150**: 175A **SD150**: 200A	400A	600A
6-40 Amperes	mid	150A (Monitor motors in this range up to 133 FLA.)*	500A	800A
40-200 Amperes	high	**D150**: 175A **SD150**: 210A (Monitor motors in this range up to 200 FLA.)*	800A	1200A

*For motors with higher FLAs and/or longer start times, and for larger diameter conductors, use an external current transformer whose secondary current flows through the sensor.

SWITCHING CHARACTERISTICS

	Low Range		Mid Range		High Range	
Input (amps)	1.0*	6.0	6.0	40.0	40.0	200.0
Hysteresis (amps)						
Models SD150, D150-1A-NL	<0.15		<0.25		<0.5	
Models D150-2A, 3A (N.O.)	<0.2		<0.2		<0.2	
Models D150-3A (N.C. side) & D150-1NC-A-NL	<0.05	<0.2	0.15	0.8	0.7	5.0
Response times*						
ON delays (ms)	150.0	200.0	70.0	60.0	40.0	70.0
OFF delays (ms)	60.0	30.0	40.0	20.0	30.0	20.0

*1.5A for **SD150**
**With sensor set to ranges above and current through sensor 5% above trip point.

INSTALLATION

1. Make sure that switched current (connected to screw terminals) is limited to 150 mA continuous, 500 momentary, and that applied voltage is no higher than 30 VDC.
2. Position the jumper for the desired range and observe maximum currents to prevent sensor failure. ***Monitoring excessive current can damage the sensor.***
3. Loop the wire through the hole. Looping the wire through the hole more than once multiplies the sensitivity but divides maximum currents.
4. The screw terminals represent a solid-state switch for controlling DC loads. Test the unit by using a circuit such as shown in wiring diagram. **An ohmmeter is not appropriate for this type of switch.**

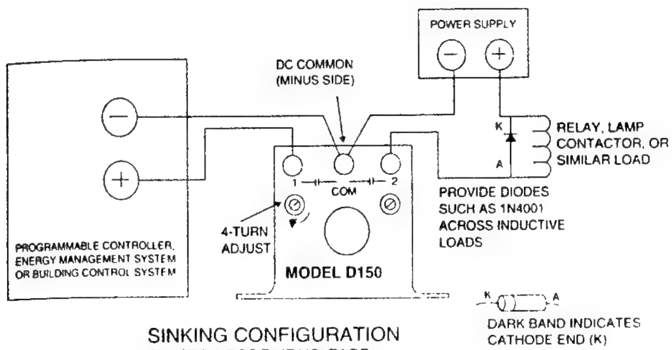
LED INDICATOR (For **SD150** only)
The LED indicates **three** states:
1. ***RAPID FLASHING***: Current has **tripped** the switch.
2. ***SLOW FLASHING***: Current is present but is **below the trip point**.
3. ***NO FLASHING***: Current is either **OFF** or **below the bottom of the range**.

SMART LED indicator on the SD150 has no off-state leakage.

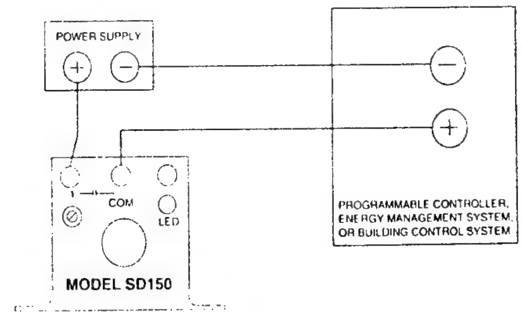
CURRENT OPERATED SWITCHES

D150 / SD150 SERIES

WIRING



SINKING CONFIGURATION
CAUSES A POSITIVE VOLTAGE TO BE PULLED ("SUNK") TO GROUND



SOURCING CONFIGURATION
ACTS AS A FLOATING SWITCH TO TURN ON ("SOURCE") A POSITIVE VOLTAGE INTO A LOAD

ADJUSTMENT

1. With the sensor wired as shown, note the LED state. The LED should be off. If no LED, use a voltmeter across the sensor contacts. Turn on the motor or other load being monitored. With "LF" suffix sensors, set the motor to its lowest speed.
2. The sensor is shipped with the 4-turn adjustment set to the most sensitive position (CW). If the sensor now operates, turn the adjustment counter-clockwise (CCW) until the operation reverses. The LED or meter will indicate this action.
3. Now turn the adjustment CW until the sensor just operates its controlled circuit. It is desirable to turn the adjustment slightly CW beyond this threshold point to provide a margin for normal current variations.

PROBLEM	PROBABLE CAUSE & CORRECTION
Sensor appears to be ON all the time.	Check your circuit for sensitivity to Off-State Leakage. Check for reverse wiring polarity. If sensor is wired backward, the reverse polarity protection diode will make the sensor appear to be on.
Adjustment has no stops. Keeps turning.	The 4-turn adjustment pot has a slip-clutch which prevents damage at either end of its rotation. To know where the adjustment is, turn the pot 4 turns CW; this sets it to the most sensitive position, e.g., 1 amp on the 1 to 6 amp range.
Sensor does not switch at all, regardless of current level.	Adjustment pot is probably backed off completely (4 turns CCW), which disables the sensor. See item immediately above for more on this.

ORDERING INFORMATION

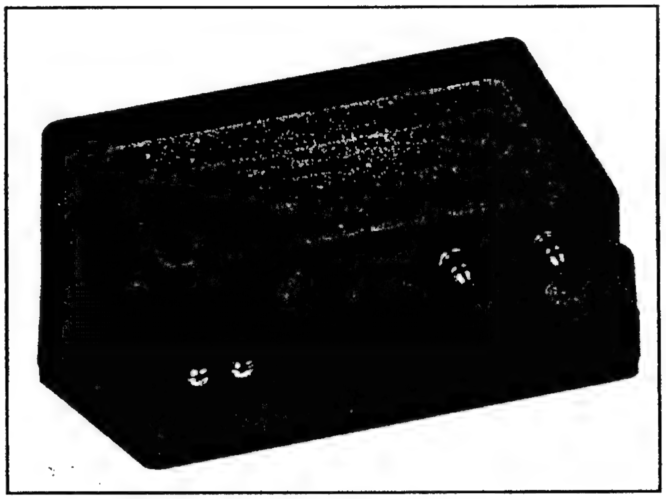
Model D150-1A-NL	**Normally Open (no LED)**
Model D150-1NC-A-NL	**Normally Closed (no LED)**
Model D150-2A	**2 N.O. Form A (no LED)**
Model D150-3A	**N.O. / N.C. Form C (no LED)**
—C Suffix	**Reduces switch on-state voltage to <0.2V**
—LF Suffix	**For variable-frequency systems down to 6 Hz**
SD150	**Split-core N.O. (with SMART LED)**

DIFFERENTIAL PRESSURE TRANSMITTER (DC Powered)

MODEL T30

DESCRIPTION

The **Modus T30** is a two-wire **Pressure Transmitter** with a 4-20 mA output. It operates on the capacitance principle and is capable of sensing very low positive, negative or differential pressures. In the capacitance cell, a very lightweight, responsive diaphragm deflects a small amount when pressure is applied. This deflection creates a change in capacitance which is then detected and processed electronically. Reliability and long life are inherent advantages of the solid-state design. A wide selection of standard pressure ranges is available.



FEATURES

- *Virtually position insensitive, even at very low pressure (0.01" W.C.) (0.025mbar)*
- *No moving parts to wear out*
- *Compact size*
- *Fast response time due to low internal volume*
- *Solid-state circuitry for long life*
- *Low power consumption*

APPLICATION

- *Medical and analytical instruments*
- *Leak detection*
- *HVAC monitoring of:*
  - *Filter differential pressures*
  - *Fan static pressures*
  - *Clean room pressures*
  - *Variable air volume systems*
  - *Velocity pressures*

SPECIFICATIONS

GENERAL	
Accuracy	±1% of range (including non-linearity and hysteresis)
Zero and span adjustments	Non-interactive adjustments are by means of 20-turn potentiometers for fine resolution.
ELECTRICAL	
Operating voltage	10 to 35VDC (See diagram on reverse side for maximum loop resistance). Protected against reversal of polarity.
Output	Limited to approx. 3.85 mA at low end of span and approx. 26 mA at upper end of span.
PRESSURE	
Ranges	See Ordering Information
Measures	Differential, gauge pressure or vacuum. Suitable for air or inert gases.
Maximum safe momentary overpressure	8 times pressure range
Port connections	3/16" Dia.suitable for: 1/8" or 5/32" ID **Tygon**™or polyurethane tubing; 1/4" OD polyethylene tubing. Integral filters at both ports.
PHYSICAL	
Dimensions	3.00"W x 5.15"L x 1.40"H (7.62 cm x 13.1 cm x 3.5 cm)
Weight	0.42 lb (190 g)
Case	Flame retardant, glass reinforced NORYL ™
ENVIRONMENTAL	
Operating temp range	32° to 125°F (0° to 52°C)
Storage temp	-20° to 160°F (-30° to 70°C)
Effect of temp	±0.05%/°C
Operating humidity range	20% to 90% RH noncondensing
Shock resistance	10 g (11 ms)
Vibration resistance	5 g to 50 Hz

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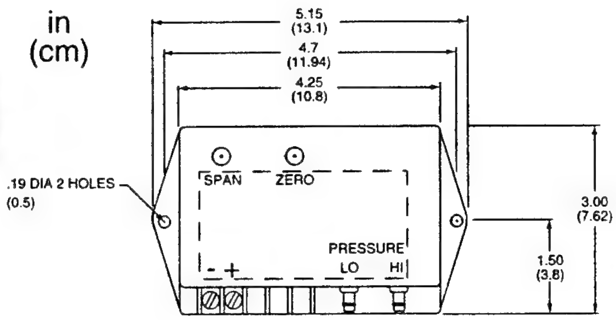
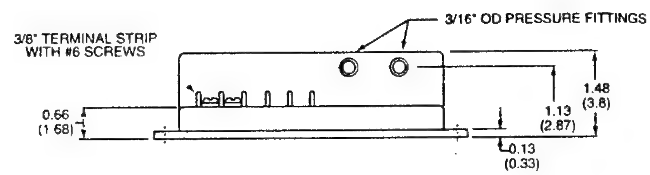
DIFFERENTIAL PRESSURE TRANSMITTER (DC Powered)

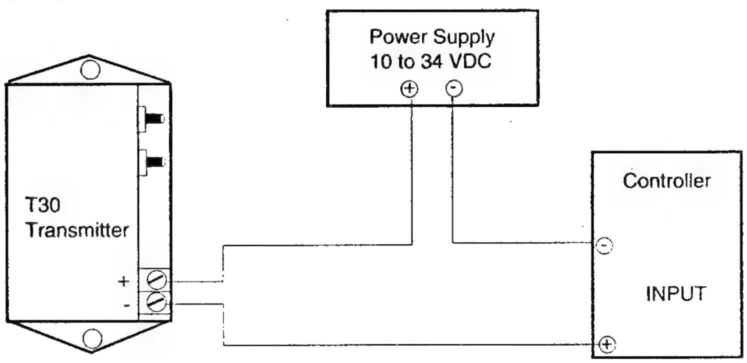
MODEL T30

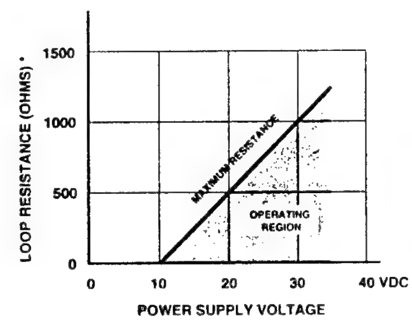
DIMENSIONS





WIRING





* Loop resistance = Wire resistance + receiver resistance

ORDERING INFORMATION

T30	MODEL
XXX	RANGE NUMBER (FROM FIGURE 1)
	OPTIONS
B	Bi-directional (12 mA @ Zero Pressure)

T30 — 001 B

Examples:

T30 - 001B

is a pressure transducer with a range of -0.1" W.C. to + 0.1" W.C. with 4 mA output @ -0.1" W.C., 12 mA @ 0" W.C. and 20 mA @ 0.1" W.C.

T30-050

is a pressure transducer with a range of 0-5.0" W.C. with 4 mA output @ 0" W.C. and 20 mA @ 5.0" W.C.

Figure 1

RANGE NUMBER	PRESSURE RANGE IN W.C.	PRESSURE RANGE MBAR
001	0-0.1	0-0.25
002	0-0.2	0-0.50
003	0-0.3	0-0.75
005	0-0.5	0-1.25
010	0-1.0	0-2.5
020	0-2.0	0-4.99
030	0-3.0	0-7.47
050	0-5.0	0-12.4
100	0-10.0	0-24.9

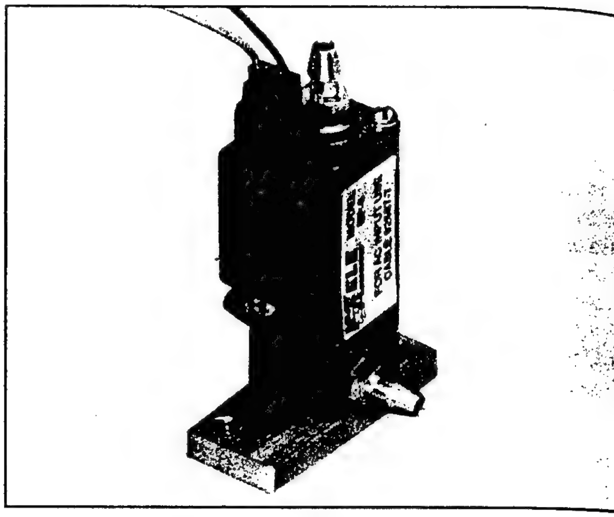
ELECTRIC / PNEUMATIC 3-WAY AIR VALVES

MODEL EP3

DESCRIPTION

The **Model EP3** is an industrial-quality **Two-Position, Three-Way Solenoid Air Valve** for use in applications where the operation of a pneumatically-operated device is dependent upon an electrical circuit.

A momentary manual override pushbutton provides operation without closing the electrical circuit. An LED provides visual indication of the air valve's status. The valve can be mounted in any position with body mounting holes or with the mounting plate furnished with the valve. Each **EP3** also comes with 16" lead wires and three barbed fittings for 1/4" plastic tubing.



FEATURES

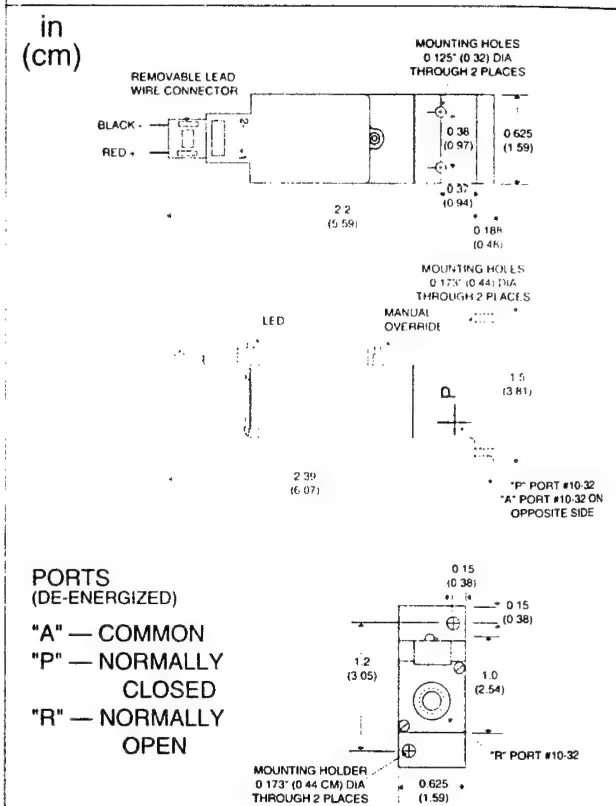
- *LED indication*
- *Industrial quality*
- *High capacity*
- *Manual override*
- *Universal porting*
- *Piping determines N.C., N.O., diverter, or selector*

SPECIFICATIONS

Pressure range	0-50 psig
Flow constant	C_V 0.04
Air capacity	500 scim at 15 psig supply with 1 psig pressure drop
Media	Air or inert gases
Air connections	#10-32 (includes 3 barbed fittings)
Ambient temp range	0° to 122°F (-18° to 50°C)
Filtration	Recommended, 40 micron
Lubrication	Not required
Coil voltage/power	115V*/2.5W 24V*/2.5W
Voltage tolerance	+15%, -10% of rated coil voltage
Coil	Rated for continuous duty
Materials	Electroless nickel, Buna N, stainless steel, anodized aluminum
Wiring	16" lead wires with removable connector

*Voltage can be AC (50/60 Hz) or DC. For AC operation, use AC lead wire model #2587-7, included with 24 VAC and 120 VAC models.

DIMENSIONS



ORDERING INFORMATION

EP3-24VAC	**24 VAC 3-Way Air Valve**
EP3-24VDC	**24 VDC 3-Way Air Valve**
EP3-120VAC	**120 VAC 3-Way Air Valve**

RELAYS

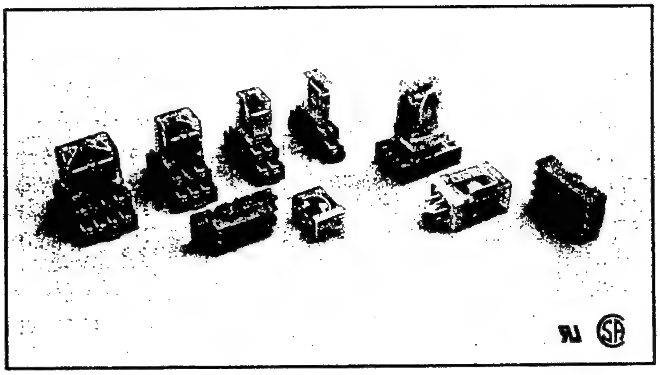
RH / RR / RHN SERIES

DESCRIPTION

IDEC Relays are available in the **RH Series Midget Power Relays**, the **RR Series Heavy Duty General Purpose Relays,** and the **RHN Low Amperage Midget Relays.** The **RH Series Midget Power Relays** are compact in size to reduce space requirements and have a full 10 amp switching capacity. **RH Series Relays** are available in SPDT, DPDT, 3PDT, and 4PDT contact configurations driven by AC or DC coils. **RH Series Relays** have blade mount terminals and the SPDT, 3PDT and 4PDT are available with top bracket mounting. The DPDT is available as a latching relay.

The **RR Series Heavy Duty General Purpose Relays** have a 10 amp contact rating and are characterized by their high reliability and long life. They are suited for use in industrial grade equipment, control equipment, communications, etc. **IDEC RR Series Relays** are available in DPDT and 3PDT configurations driven by AC or DC coils. **RR Series Relays** have pin type terminals.

The **RHN Series** features a lower amperage coil and silver contacts. These are available in a SPDT blade configuration.



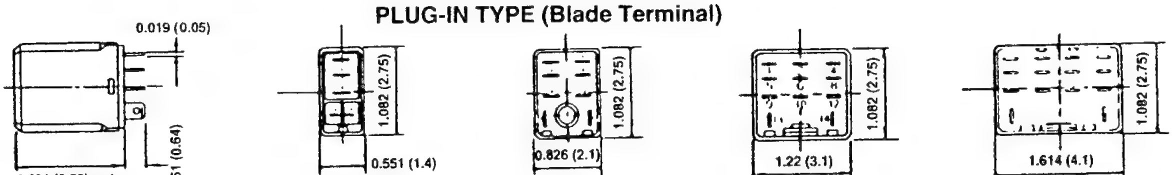
FEATURES

- *General purpose and midget sizes available*
- *10 amp contact rating (5 amp available on RHN)*
- *UL recognized and CSA certified*
- *Indicator light or check button available on 2, 3, and 4-pole models*
- *Complete line of accessories for flexible application*

DIMENSIONS

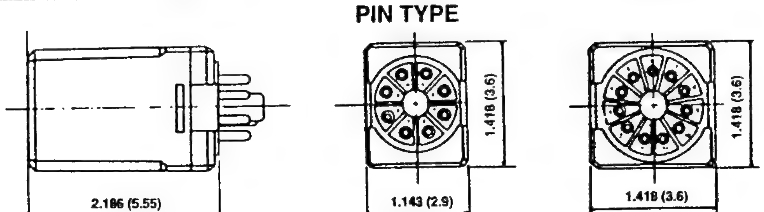
in (cm)

PLUG-IN TYPE (Blade Terminal)



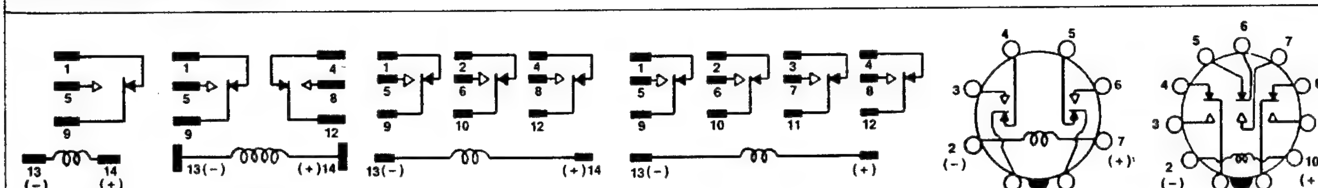
RH1B
RHN1B
RH2B
RH3B
RH4B

PIN TYPE



RR2P
RR3PA

CIRCUIT DIAGRAMS



RH1, RHN1B
RH2
RH3
RH4
RR2P
RR3PA

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RELAYS

RH / RR / RHN SERIES

RATINGS

COIL RATING RH SERIES

	Rated Voltage (V)	Rated Current (mA) ±15% at 20°C 60 Hz SPDT	60 Hz DPDT	60 Hz 3PDT	60 Hz 4PDT	50 Hz SPDT	50 Hz DPDT	50 Hz 3PDT	50 Hz 4PDT	Coil Resistance (Ω) ±15% at 20°C SPDT	DPDT	3PDT	4PDT
AC	6	150	200	280	330	170	238	330	387	18.8	9.4	6.0	5.4
	12	75	100	140	165	86	118	165	196	76.8	39.3	25.3	21.2
	24	37	50	70	83	42	59.7	81	98	300	153	103	84.5
	120	7.5	11	14.2	16.5	8.6	12.9	16.4	19.5	7680	4170	2770	2220
	*240	—	5.5	7.1	8.3	—	6.5	8.2	9.8	—	15210	12100	9120
		SPDT		DPDT		3PDT		4PDT		SPDT	DPDT	3PDT	4PDT
DC	6	128		150		240		250		47	40	25	24
	12	64		75		120		125		188	160	100	96
	24	32		36.9		60		62		750	650	400	388

UL & CSA HORSEPOWER RATINGS RH SERIES

MOTOR LOAD	SPDT, DPDT	3PDT
240 VAC	1/3 HP	1/3 HP
120 VAC	1/6 HP	1/6 HP

COIL RATINGS RR SERIES

	Rated Voltage (V)	Rated Current (mA) ± 15% @ 20°C 60 Hz	50 Hz	Coil Resistance (Ω) ± 10% @ 20°C
AC	6	420	490	4.9
	12	210	245	18
	24	105	121	79
	120	20.5	24	2,100
	240	10.5	12.1	8,330
DC	6	240		25
	12	120		100
	24	60		400

COIL RATINGS RHN SERIES

Voltage (VDC)	Rated Current (mA) ± 15% @ 20°C 5A	10A	Coil Resistance (Ω) ± 10% @ 20°C 5A	10A
6	50	83.3	120	72
12	25	41.7	480	288
24	12.5	20.8	1920	1150

Note: **Maximum continuous applied voltage (AC/DC)@20°C: 110% of rated voltage.**
Minimum operate voltage (AC/DC)@20°C: 80% of rated voltage.
Drop-out voltage (AC) @20°C: 30% of rated voltage.
Drop-out voltage (DC) @20°C: 15% of rated voltage.

CONTACT RATING RH SERIES - UL RATINGS

VOLTAGE (V)	RESISTIVE (A) SPDT	DPDT	3PDT	4PDT	GENERAL USE(A) SPDT	DPDT	3PDT	4PDT
240 AC	10	10	—	7.5	7	7	•	5
120 AC	10	10	10	10	7.5	—	—	7.5
30 DC	10	10	10	—	7	7	—	—
28 DC	10	10	10	10	7.5	—	—	7.5

Note:*6.5A/Pole, 20A Total

CONTACT RATING RR SERIES

VOLTAGE	UL RATINGS RESISTIVE(A)	GEN.USE(A)	MOTOR LOAD
240 AC	10	7	1/3 hp
120 AC	10	7.5	1/4 hp
30 DC	10	7	—

CONTACT RATINGS RHN SERIES

LOAD	RHN1B-5U RESISTIVE	RHN1B-5U INDUCTIVE	RHN1B-10U RESISTIVE	RHN1B-10U INDUCTIVE
MAXIMUM RATED LOAD	AC: 120V/5A DC: 24V/5A	AC: 120V/3.5A DC: 24V/2.5A	AC: 120V/10A DC: 24V/10A	AC: 120V/7.5A DC: 24V/5A
MAXIMUM OPERATION RATING	AC:550VA DC:120W	AC:385 VA DC:60W	AC: 1100 VA DC:240W	AC:825VA DC:120W
MAX LOAD CURRENT	5A		10A	
MAX LOAD VOLTAGE	AC:250V DC:125V		AC:250V DC:125V	

ORDERING INFORMATION

TYPE	CONTACT CONFIGURATION	BASIC MODEL	W/INDICATOR LIGHT	W/CHECK BUTTON	W/IND. LIGHT & CHECK BUTTON	TOP BRACKET MOUNT TYPE	LATCHING
MIDGET	SPDT	RHN1B-5U*	—	—	—	—	—
	SPDT	RHN1B-10U*	—	—	—	—	—
	SPDT	RH1B-U	—	—	—	RH1B-UT	—
	DPDT	RH2B-U	RH2B-UL	RH2B-UC	RH2B-ULC	RH2B-UT	RH2LB-U
	3PDT	RH3B-U	RH3B-UL	RH3B-UC	RH3B-ULC	—	—
	4PDT	RH4B-U	RH4B-UL	RH4B-UC	—	RH4B-UT	—
GENERAL PURPOSE	DPDT	RR2P-U	RR2P-UL	—	—	—	—
	3PDT		RR3PA-U	RR3P-UL	—	—	—

AVAILABLE COILS	AC	DC
	24V	6V
	120V	12V
	240V	24V

*AVAILABLE IN DC ONLY

Related Products
Sockets
BAM-1000 or DIN-3F Mounting Track

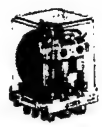
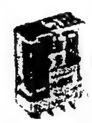
To Order: Select the basic model from the table, indicate AC or DC and the voltage. Example: **RH2B-UAC24V** - DPDT Midget Relay with 24 VAC coil.

14

RELAY SELECTION GUIDE

RR / RH / RHN SERIES

RELAY SELECTION GUIDE

	Series	Contact				Coil	
		Terminal Style	Configuration	Material	Resistive	Rated Voltage	Power Consumption
	RR Series Power Relays	• Pin/Octal	• SPDT • DPDT • 3PDT	Silver	10A, 120 VAC, 240 VAC 10A, 30 VDC 1/3 hp, 240 VAC 1/4 hp, 120 VAC	AC: 6, 12, 24, 120, 240V DC: 6, 12, 24, 48, 110V	AC: 2.5 VA DC: 1.5W
	RH Series Midget Relays	• Blade/Plug-in	• SPDT • DPDT • 3PDT • 4PDT	Silver-Cadmium Oxide	10A, 120 VAC 240 VAC 10A, 30 VDC 1/3 hp, 240 VAC 1/6 hp, 120 VAC	AC: 6, 12, 24, 120, 240V DC: 6, 12, 24 48, 110V	• SPDT AC: 1.1 VA DC: 0.8W • DPDT AC: 1.4 VA DC: 0.9W • 3PDT AC: 2 VA DC: 1.7W • 4PDT AC: 2.5 VA DC: 1.5W
	RHN Series Low Current Relays	• Blade/Plug-in	• SPDT	Silver	10 amp Model 7.5A, 240 VAC 10A, 120 VAC 10A, 30 VDC 1/3 hp, 240 VAC 1/6 hp, 120 VAC	DC: 6, 12 24, 48V	• 0.3W (5A) • 0.5W (10A)
	RR2KP Series Latch Relays	• Pin/Octal	DPDT	Silver	10A, 120 VAC 10A, 30 VDC	AC: 6, 12, 24, 120, 240V DC: 6, 12, 24, 48, 110V	AC: 2.2 VA DC: 1.5W

ORDERING INFORMATION

RR **2** **[ ]** **P** – **[ ]** **U** **DC24V**

1. RELAY SERIES
RR, RH, RHN

2. CONTACT CONFIGURATION
1.........Single Pole Double Throw (SPDT)
2.........Double Pole Double Throw (DPDT)
3.........Three Pole Double Throw (3PDT)
4.........Four Pole Double Throw (4PDT)

3. SYMBOL TO DESIGNATE LATCH RELAY
K........Self-Retaining Magnetic Type (RR Series)
L........Self-Retaining Magnetic Type (RH Series)

4. TERMINAL STYLE
P/PA........Pin / Octal
B/BA.......Blade / Plug-in

5. CURRENT RATING
(RHN STYLE ONLY)
5.........5 amp
10.......10 amp

6. RATINGS / ACCESSORIES
U........UL / CSA
UT......Top Bracket Mounting
UL......Equipped with Indicator Light
UC.....Equipped with Check Button
ULC...Indicator Light & Check Button

7. COIL VOLTAGE

Example: RR2P - UDC24V - DPDT Power Relay with Pin Terminals and 24 VDC Coil

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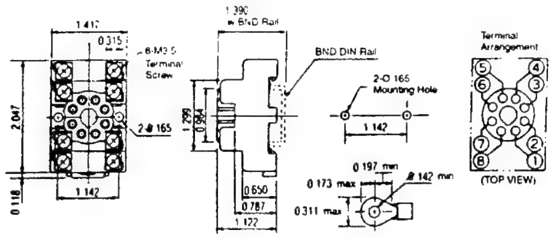
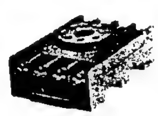
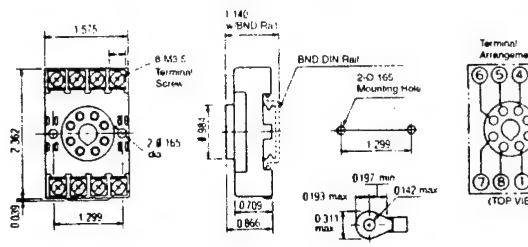
HEAVY DUTY - GENERAL PURPOSE SOCKETS

SR SERIES / SNAP-MOUNT

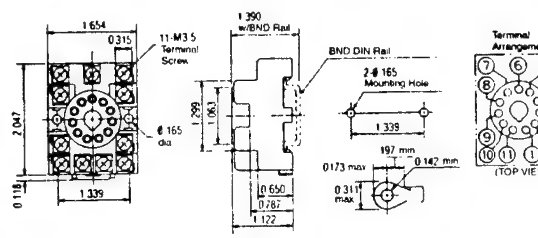
SR2P-05
Type: 8-pin octal, snap-mount/surface-mount
Terminal: M3.5 screws w/captive wire clamp
Wire Size: Max up to 2-#12 AWG
Electrical Rating: 300V, 10A
Relay No.: RR2P
Timer No.: RTE-P1
Hold-Down Spring: SR2B-02F1
Hold-Down Clip: SFA-203

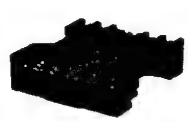
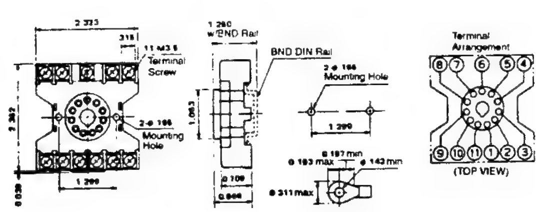
SR2P-06
Type: 8-pin, snap-mount/surface-mount
Terminal: M3.5 screws w/captive wire clamp
Wire Size: Max up to 2-#12 AWG
Electrical Rating: 300V, 10A
Relay No.: RR2P
Timer No.: RTE-P1
Hold-Down Spring: SR2B-02F1
Hold-Down Clip: SFA-202

SR3P-05
Type: 11-pin octal, snap-mount/surface-mount
Terminal: M3.5 screws w/captive wire clamp
Wire Size: Max up to 2-#12 AWG.
Electrical Rating: 300V, 10A
Relay No.: RR3PA, RR2KP*
Timer No.: RTE-P2
Hold-Down Spring: SR3B-02F1, SR3P-06F3**
Hold-Down Clip: SFA-203
*Latching type relay **For RR2KP relay

SR3P-06
Type: 11-pin octal, snap-mount/surface-mount
Terminal: M3.5 screws w/captive wire clamp
Wire Size: Max up to 2-#12 AWG
Electrical Rating: 300V, 10A
Relay No.: RR3PA, RR2KP *
Timer No.: RTE-P2
Hold-Down Spring: SR3B-02F1, SR3P-06F3**
Hold-Down Clip: SFA-202
*Latching type relay **For RR2KP relay

Dimensions indicated in inches

14

NOTE: For Touch-Safe Sockets, add C to the end of the catalog number.

SELECTOR SWITCHES

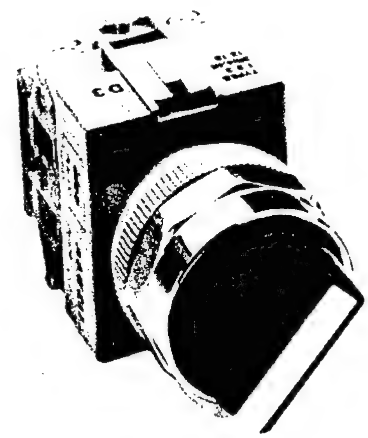
ASW SERIES

DESCRIPTION

General purpose selector switches for pilot duty control of electrical equipment.

FEATURES

- ***Snap-fit block comes in N.O. and N.C. contacts***
- ***Contacts are self-cleaning***
- ***Operator base made of durable nylon***
- ***Switches are UL listed - file #E70646 and CSA Certified - file #LR48366***

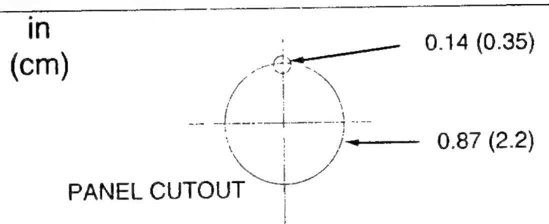


KNOB TYPE SELECTOR SWITCH

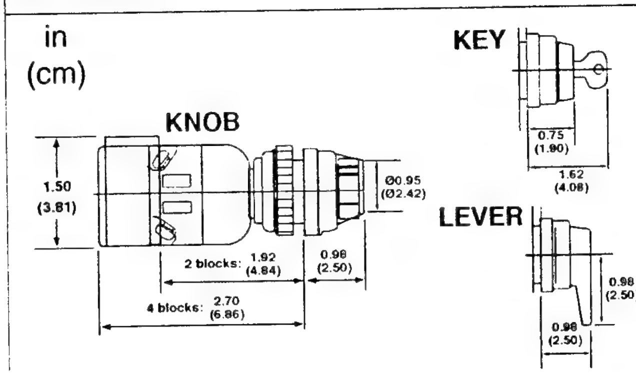
SPECIFICATIONS

Contact resistance	50 MΩ maximum (initial valve)
Insulation resistance	100 MΩ minimum between live and dead parts
Mechanical life	500,000 minimum operations
Electrical life	500,000 minimum operations
Contact rating	10 amps 600 VAC, VDC
Terminals	#6-40 (M3.5) screws (Terminal tab adaptor and wire wrap terminal available)

INSTALLATION



DIMENSIONS



ORDERING INFORMATION

Assembled Selector Switches		
	1 N.O. Contact 2 Position (Off-On)	2 N.O. Contacts 3 Position (On-Off-On)
Knob Type	ASW210	ASW320
Lever Type	ASW2L10	ASW3L20
Key Type	ASW2K10	ASW3K20
Legend Plate	NWAL (212) – Off-On	NWAL (317) – Hand-Off-Auto
Call Kele & Associates for selector switches with other contact arrangements and for other legend plates.		

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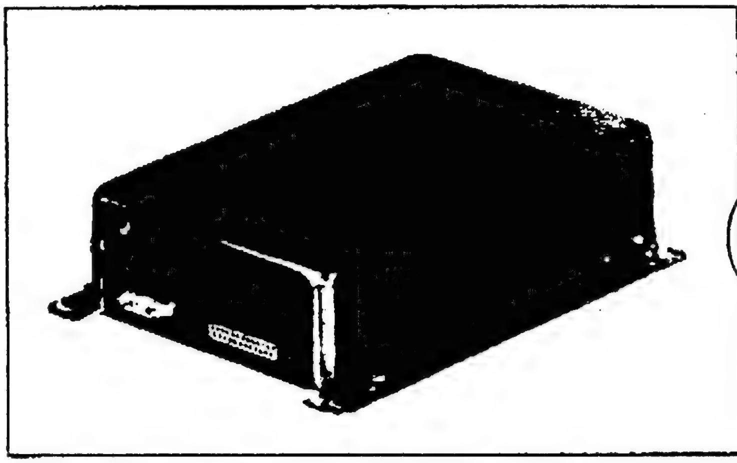
Neulink 1200/2400 Baud Radio Modem



136-960 MHz Radio Modem Available as a Transceiver Only

$725.00

The Neulink DCL-1200/2400 Radio Modem provides the user with a cost effective means of communication without the use of telephone lines or cables.

The DCL-1200/2400 is specifically designed for extreme environmental conditions ranging from -30°C to +60°C and each unit is 100% hand tested.

The DCL-1200/2400 Radio Modem uses VHF, UHF and 900 MHz FM radio channels for data transfer between computers or terminals with speeds up to 1200 or 2400 bits per second in simplex configuration.

Real World Design For Real World Applications

- IBM PC Compatible
- Heavy Duty Industrial Enclosure
- Full DTE RS-232-C (V.24) Compatible
- Adjustable RF Power Levels, 1-5 Watts VHF, 1-2 Watts UHF & 900 MHz
- Separate Transmit, Receive, Modem and RS-232-C Boards
- Each Unit is 100% Hand Tested
- FCC Type Acceptance

RF NEULINK

7620 Miramar Road, San Diego, CA 92126-4202 • 800-233-1728 • (619) 549-6340 • FAX (619) 549-6345

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Neulink Transmitters & Receivers 1200/2400 Baud Radio Modem Specifications

General Specifications

5 Function LED Status Display

Single Polarity Supply Operation-RS-232 Levels Generated by Internal Charge Pumps

Jumper Selectable DTR (Hi or Lo Enable)

Jumper Selectable DCD

Optional Active Data Terminal Ready with Application of Power

Model Number:	DCL-1200/2400-RS
AFSK Frequencies	
1200 Baud:	Mark=1300Hz Space=2100 Hz
2400 Baud:	Mark=2400 Hz Space=4400 Hz
FCC Compliance:	Parts 15, 21, 90, 94
RF Connector:	50 ohm BNC Fem.
Power Connector:	Molex
Control Connector:	DB 25 Female
Operating Temp:	-30°C to +60°C
Storage Temp:	-40°C to +75°C
Humidity:	<95% non-condensing
Operating Voltage:	12.5VDC ±10%
Operating Current:	1.7 amps Max. at 12.5VDC
Transmission Modes:	15F2, 16F9
Dimensions:	8.0" x 6.0" x 2.5"

Transmitter Specifications

Frequency Range:	136-174 MHz 450-470 MHz 928-960 MHz
Number of Channels:	One (crystal controlled)
Frequency Stability:	±5 PPM over full operating temperature range (Opt 1.5 PPM 900 MHz Only)
RF Power Output:	1-5 Watts VHF, 1-2 Watts UHF and 900 MHz
Duty Cycle:	100% Standard
FM Hum & Noise:	-50 dB Min.
Spurious and Harmonic Output:	-60 dB Min.
Carrier Attack Time:	<10 mS for 95% power, carrier within 1 KHz

Receiver Specifications

Frequency Range:	136-174 MHz 450-470 MHz 928-960 MHz
Number of Channels:	One *(crystal controlled)*
Frequency Stability:	VHF: ±7.5 PPM UHF & 900: ±5.0 PPM
Sensitivity 12 dB SINAD:	0.25 µV *(with 6dB/ oct de-emphasis)*
Sensivity 20 dB Quieting:	0.5 µV
Signal Present Indicator Threshold:	0.2 µV *(switch time <50mS at threshold)*
Intermodulation:	-23 dBm typical 3rd order intercept
I.F. Selectivity:	6 dB *(bandwidth = ± 7.5 KHz Min.)* 60 dB *(bandwidth = ±25 KHz Max.)*
Bit Error Performance:	-107dBm(1.0 µV) for BER $1x10^{-3}$ over voltage and temperature range

Note: Specifications subject to change without notice.

NEULINK

RADMODM.PM5 2/94

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UltraLink Cable®

50' Cable + ANTENNA
$320

UltraLink Cable® Makes The Best Connections

Both of our UltraLink Cables® were designed to provide the best transmission lines for your applications. The smaller UltraLink Cables are designed to be electrically and mechanically efficient for mobile applications. The new UltraLink Cable 93605 is designed for medium run base station applications. It is the lowest loss RG213 size cable.

When we designed these cables we started from scratch. UltraLink cables are easily installed, low loss, and compatible with readily available connectors.

Mobile UltraLink

Mobile UltraLink®

We started with a solid center conductor for the secure attachment of crimp-on connectors. We insulated it with a layer of low loss Teflon® dielectric which withstands the high temperatures encountered in mobile applications.

Next we applied a layer of easily removed friction bound aluminum foil for 100% shielding. On top of that, we added tinned copper braid with full 95% coverage for good grip to the connector's outer shell. Finally, we selected a smooth, tough PVC jacket. The result is UltraLink 92463 (white) and UltraLink 92887 (black) RG58-size cable.

$194/1000'

	Attenuation/100 ft.	
Frecuency	RG58-Size White (90263) Black (92887)	RG213 Size Black (93605)
30 MHz	2.5 dB	0.7 dB
150 MHz	5.1 dB	1.5 dB
450 MHz	9.5 dB	2.7 dB
900 MHz	14.0 dB	4.1 dB
2400 MHz	36.0 dB	6.7 dB

Base Station UltraLink

In designing the ultimate medium run base station cable, we began with a different set of goals. The center conductor is solid copper for the same reasons; it is low loss and aids in solid connection of crimp-on connectors. Next, we added a layer of foam polyethylene whose velocity of propagation is 89% that of air. This fact adds significantly to the low loss characteristics of the cable but it prevents the migration of water through the dielectric. Next, we add a layer of foil and a 95% coverage braid. The jacket is black PVC which withstands sunlight and weathering for many years.

TL99605

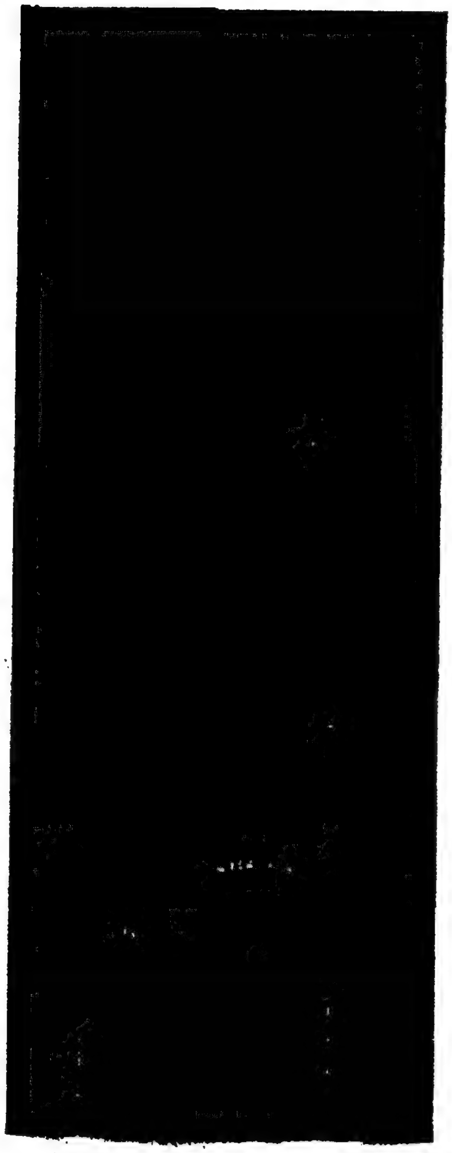
Cushcraft/Signals- Always a step ahead

We listen to our customers. And we respond. That's why Cushcraft/Signals is a major supplier of antenna products, and it's why we want to be your first choice for every application.

From engineering to manufacturing to marketing, the Cushcraft/Signals staff meets challenges head-on. We are committed to providing fine products and first rate service. A phone call to your favorite distributor, or to our factory will prove that we stay a step ahead of the competition.

Cushcraft/Signals, Manchester, NH

Ringo Ranger II, Ringo Ranger, and Ringo VHF base station antennas... Cushcraft/Signals has taken a good idea and made it better!



Reliable, long life, and economical antennas

These popular base-station antennas have been selected for use with repeaters, talk-around systems, paging systems, security alarms, VHF dedicated systems such as police, fire, and agricultural, and hundreds of other applications requiring reliability, long life, and economy.

Field tunable and easy to install, they can be mounted on any vertical tubular support up to 1-1/4 in (3.2 cm) diameter.

Here's a money-saver: Ringo, Ringo Ranger, and Ringo Ranger II can be shipped economically by UPS!

Ringo Ranger II CRX-150B 6 dB gain

Here is our most popular base station antenna. With a frequency range of 150-174 MHz and a full 6 dB gain versus a quarter wave, the Ringo Ranger II is perfect for dedicated systems where ease of installation, performance, and economy are priorities.

Ringo Ranger CRX-150 5 dB gain

Field tunable and easily installed, the Ringo Ranger has a frequency range of 150-174 MHz and 5 dB gain.

Just measure the radiator length, tighten two clamps, and the antenna is assembled. A simple adjustment of the tuning rod, and you're ready to go!

Rugged Ringo CRS-150 2 dB gain

Our Ringo is a single half-wave, end-fed antenna with a matching section featuring a ring inductor. With a frequency range of 150-174 MHz and 2 dB gain, the Ringo is completely DC grounded.

It is shipped with a fully assembled base section and requires only adjustment of the radiator tube and simple tuning to be operational.

Ringos include stainless steel hardware and radiators crafted from seamless aluminum tubing.

Close-up detail of Ringo shows stainless steel hardware and connector assembly.

VHF Ringo Selector Guide

Model Number	Frequency MHz	Gain dB	Height Ft	(m)
CRX-150B	150-174	6	13.5	(4.1)
CRX-150	150-174	5	9.7	(2.9)
CRS-150	150-174	2	3.0	(1.1)

Wind survival, all models: 80 mph (125 kph)
Max mast mount, all models: 1.25 in (3.2 cm)

Ringo

Field tunable	[illegible]	[illegible]	[illegible]
DC grounded	[illegible]	[illegible]	[illegible]
Seamless hard-drawn aluminum tubing	[illegible]	[illegible]	[illegible]
Stainless steel hardware	[illegible]	[illegible]	[illegible]
Fast assembly	[illegible]	[illegible]	[illegible]
UPS-shippable	[illegible]	[illegible]	[illegible]

VHF Yagis

- Heavy duty construction
- Preset Reddi match feed system
- Optional N-female connectors
- Stainless steel hardware
- Stackable for additional gain

ECONOMY P SERIES

- 3/16 in. solid aluminum elements
- Heavy-wall booms
- 50 Ohm UHF female connectors

$310.00

Superior construction means system reliability

Outstanding performance and mechanical integrity make these antennas an excellent value.

Heavy-Duty PLC series 7.1 or 11.1 dB gain

The Cushcraft/Signals PLC Yagis are heavy-duty point-to-point antennas, commonly used in data transmission and control station applications.

With a frequency range of 129-174 MHz, they feature a pre-set Reddi match and can be quickly and easily assembled at the installation site. Precisely machined boom-to-element blocks prevent corrosion and noise buildup.

Economy P series 6.5 dB gain

VHF economy Yagis are available in broadband 4-element models with frequency ranges of 130-174 MHz.

Pre-tuned and easily assembled they are designed to be rear-mounted and can be stacked for an additional 3 dB gain using our coaxial stacking kits (page 21).

These high-performance communication antennas are ideal for such applications as control stations, security service, wildlife tracking remote pickup, remote terminal units, and portable emergency stations.

Heavy-Duty PLC Yagi Selector Guide

Model Number (*)	Frequency MHz	Gain dBd	Number of Elements
PLC-1296	125-137	7.1	6
PLC-1346	134-142	7.1	6
PLC-1426	142-150	7.1	6
PLC-1506	150-158	7.1	6
PLC-1586	158-166	7.1	6
PLC-1666	166-174	7.1	6
PLC-1369	136-142	11.1	9
PLC-1429	142-150	11.1	9
PLC-1509	150-158	11.1	9
PLC-1589	158-166	11.1	9
PLC-1669	166-174	11.1	9

Wind survival, six-element models: 125 mph (200 kph), nine-element models: 100 mph (161 kph)
Max. mast mount, all models: 2 in (5 cm)

* To order with an N-Connector add an N to the model number. For example, PLC-1509N

[illegible]

Model Number	Frequency MHz	Gain dBd	Number of Elements
P134-4	130-134.5	6.5	4
[illegible]	[illegible]	6.5	[illegible]
P142-4	138-142.5	6.5	4
P146-4	142-146.5	6.5	4
P150-4	146-150.5	6.5	4
P154-4	150-154.5	6.5	4
P158-4	154-158.5	6.5	4
P162-4	158-162.5	6.5	4
P166-4	162-166.5	6.5	4
P170-4	166-170.5	6.5	4
P174-4	170-174.5	6.5	4

Wind survival, all models: 80 mph (125 kph)
Max. mast mount, all models: 2 in. (5 cm)

APPENDIX F

HVAC SYSTEM ECONOMIC SUMMARY

UTILITY MONITORING AND CONTROL SYSTEM
FORT RILEY, KANSAS

SYSTEM POINT INFORMATION

(Column Descriptions)

BLDG	=	Building Number
SYSTEM TYPE	=	The system type found on drawings or during field survey. Existing equipment number designations were used when possible.

<u>SYSTEM NUMBER</u>

1 - Small hot water boiler
2 - Large hot water boiler
3 - Small steam boiler
4 - Large steam boiler
5 - Steam to hot water converter
6 - Small air cooled chiller
7 - Large air cooled chiller
8 - Air cooled DX compressor
9 - Water cooled chiller
10 - Multizone air handling unit
11 - Variable Air Volume air handling unit
12 - NOT USED
13 - Large Single Zone air handling unit
14 - Large Single Zone air handling unit with humidification
15 - Small Single Zone air handling unit
16 - Heating and Ventilating Unit
17 - Heating and Ventilating Unit with Return Fan
18 - Dual Duct air handling unit
19 - Fan coil
20 - Infrared Radiant Heaters
21 - Unit heater
22 - Heat Pump
23 - Ventilation fan
24 - Dual temperature water pump (used for fan coil units)
25 - Hot water radiation pump
26 - Pump
27 - Perimeter radiation valve
28 - Domestic Hot water storage tank
29 - Water level alarm
30 - Cold Storage - Bldg. 650

31 - Cold Storae - Bldg. 652
32 - Pneumatic Control Air
33 - Multizone AHU with humidification

DDC FUNCTION NO.

1- Scheduled start/stop control - HW boiler; Optimum start/stop control HW boiler; Night setback - HW Boiler

2- Hot water reset - HW Boiler

3- Remote Boiler Monitoring - HW Boiler

4- Alarms - HW Boiler

5- Not Used

6- Remote Boiler Monitoring - Large STM Boiler

7- Steam Boiler Monitoring

8- Scheduled start/stop control - STM-HW Converter

9- Hot water reset - STM-HW Converter

10- Scheduled start/stop control - Chiller, Optimum start/stop control - Chiller; Demand limiting - Chiller; Night setback - Chiller

11- Chilled water reset - Small Air Cooled Chiller

12- Chilled water reset - Large Air Cooled Chiller

13- Chilled water reset and alarms - Water Cooled Chiller

14- Condenser water reset and alarms - Water Cooled Chiller

15- Chiller demand limiting - Water Cooled Chiller

16- Alarms - Chiller

17- Scheduled start/stop control - DX Compressor; Optimum start/stop control - DX Compressor, Demand limiting - DX Compressor

18- Scheduled start/stop control - AHU; Optimum start/stop - AHU Demand limiting - AHU; Duty Cycling - AHU; Night setback - AHU

19- Scheduled Start/stop control - AHU w/RF; Optimum start/stop - AHU w/RF; Demand limiting - AHU w/RF; Duty Cycling - AHU w/RF Night setback - AHU w/RF

20- Scheduled start/stop control - Unitary Equip; Optimum start/stop - Unitary Equip; Night setback - Unitary Equip.

21- Scheduled start/stop control - Ventilation Fan; Optimum start/stop - Ventilation Fan; Night setback - Ventilation Fan

22- Scheduled start/stop control - DTW Pump; Optimum start/stop - DTW Pump; Demand limiting - DTW Pump; Duty Cycling - DTW Pump; Night setback - DTW Pump.

23- Scheduled start/stop control - HW Pump; Optimum start/stop - HW Pump: Night setback - HW Pump

24- Scheduled start/stop control - Pump; Optimum start/stop - Pump; Demand limiting - Pump; Duty Cycling-Pump; Night setback - Pump

25- Optimum start/stop - Perimeter Rad Valve; Night setback - Perimeter Valve

26- Direct digital control - Large SZ AHU

27- Direct digital control - Small SZ AHU

28- Direct digital control - Dual Duct AHU

29- Direct digital control - MZ AHU

30- Direct digital control - H&V Unit

31- Direct digital control - AHU w/ Space Humidity Control

32- Direct digital control - VAV AHU

33- Outside air damper ventilation and recirculation control - AHU

34- Outside air damper ventilation and recirculation control - Dual Duct AHU

35- Outside air damper economizer control - MZ AHU

36- Outside air damper economizer control - AHU

37- Outside air damper economizer control - Dual Duct AHU

38- Direct Digital Control - Multizone AHU w/humidification

39- Direct Digital Control - VAV AHU w/Return Fan

40- Maintenance (filter) alarm - AHU

41- NOT USED

42- Chiller demand limiting - Small Air Cooled Chiller

43- Chiller demand limiting - Large Air Cooled Chiller

44- Optimum Start/Stop Control - DHW Storage Tank

45- Cold Storage - Bldg. 650

46- Cold Storage - Bldg. 652

47- Pneumatic Control Air

SYSTEM FUNCTION DESCRIPTION

<u>System No.</u>

1 Small hot water boiler

<u>DDC Function</u>

1 Scheduled start/stop control - HW Boiler
Optimum start/stop control - HW Boiler
Night setback - HW Boiler
2 Hot water reset - HW Boiler
4 Alarms - HW Boiler

2 Large hot water boiler

<u>DDC Function</u>

3 Remote Boiler Monitoring - HW Boiler

3 Small steam boiler

7 Steam Boiler Monitoring

<u>DDC Function</u>

4 Large steam boiler

<u>DDC Function</u>

6 Remote Boiler Monitoring - Large STM Boiler

5 Steam to hot water converter

<u>DDC Function</u>

8 Scheduled start/stop control - STM-HW Converter
Optimum start/stop control - STM-HW Converter
Night setback - STM-HW Converter
9 Hot water reset - STM-HW Converter

SYSTEM FUNCTION DESCRIPTION

System No.

6 Small air cooled chiller

DDC Function

10	Scheduled start/stop control - Chiller
	Optimum start/stop control - Chiller
	Demand limiting - Chiller
	Night setback - Chiller
11	Chilled water reset - Small air cooled chiller
16	Alarms - Chiller
42	Chiller Demand Limiting - Small air cooled chiller

7 Large air cooled chiller

DDC Function

10	Scheduled start/stop control - Chiller
	Optimum start/stop control - Chiller
	Demand limiting - Chiller
	Night setback - Chiller
12	Chilled water reset - Large air cooled chiller
16	Alarms - Chiller
43	Chiller Demand Limiting - Large air cooled chiller

8 Air cooled DX compressor

DDC Function

17	Scheduled start/stop control - DX Compressor
	Optimum start/stop control - DX Compressor
	Demand limiting - DX Compressor

9 Water cooled chiller

DDC Function

10	Scheduled start/stop control - Chiller
	Optimum start/stop control - Chiller
	Demand limiting - Chiller
	Night setback - Chiller
13	Chilled water reset and alarms - Water cooled chiller
14	Condenser water reset and alarms - Water cooled chiller
15	Chiller demand limiting - Water cooled chiller

SYSTEM FUNCTION DESCRIPTION

System No.

10 Multizone air handling unit

DDC Function

18	Scheduled start/stop control - AHU
	Optimum start/stop control - AHU
	Demand limiting - AHU
	Night setback - AHU
29	Direct digital control - MZ AHU
33	Outside air damper ventilation and recirculation control - MZ AHU
35	Outside air damper economizer control - MZ AHU
40	Maintenance (filter) alarm

11 Variable Air Volume air handling unit

DDC Function

18	Scheduled start/stop control - AHU
	Optimum start/stop control - AHU
	Demand limiting - AHU
	Night setback - AHU
32	Direct digital control - VAV AHU
33	Outside air damper ventilation and recirculation control - AHU
36	Outside air damper economizer control - AHU
40	Maintenance (filter) alarm

12 Variable Air Volume air handling unit with Return Fan

DDC Function

19	Scheduled start/stop control - AHU w/ Return Fan
	Optimum start/stop control - AHU w/ Return Fan
	Demand limiting - AHU w/ Return Fan
	Night setback - AHU w/ Return Fan
39	Direct digital control - VAV AHU w/ Return Fan
33	Outside air damper ventilation and recirculation control - AHU
36	Outside air damper economizer control - AHU
40	Maintenance (filter) alarm

SYSTEM FUNCTION DESCRIPTION

System No.

13 Large Single Zone air handling unit

DDC Function

18	Scheduled start/stop control - AHU
	Optimum start/stop control - AHU
	Demand limiting - AHU
	Night setback - AHU
26	Direct digital control - Large SZ AHU
33	Outside air damper ventilation and recirculation control - AHU
36	Outside air damper economizer control - AHU
40	Maintenance (filter) alarm

14 Large Single Zone air handling unit with Humidification

DDC Function

18	Scheduled start/stop control - AHU
	Optimum start/stop control - AHU
	Demand limiting - AHU
	Night setback - AHU
31	Direct digital control - AHU w/ Space Humidity Control
33	Outside air damper ventilation and recirculation control - AHU
36	Outside air damper economizer control - AHU
40	Maintenance (filter) alarm

15 Small Single Zone air handling unit

DDC Function

18	Scheduled start/stop control - AHU
	Optimum start/stop control - AHU
	Demand limiting - AHU
	Night setback - AHU
27	Direct digital control - Small SZ AHU
33	Outside air damper ventilation and recirculation control - AHU
36	Outside air damper economizer control - AHU

SYSTEM FUNCTION DESCRIPTION

System No.

16 Heating and Ventilating Unit

DDC Function

18 Scheduled start/stop control - AHU
Optimum start/stop control - AHU
Demand limiting - AHU
Night setback - AHU
30 Direct digital control - H&V Unit
33 Outside air damper ventilation and recirculation control - H&V Unit

17 Heating and Ventilating Unit with Return Fan

DDC Function

19 Scheduled start/stop control - AHU w/ Return Fan
Optimum start/stop control - AHU w/ Return Fan
Demand limiting - AHU w/ Return Fan
Night setback - AHU w/ Return Fan
30 Direct digital control - H&V Unit
33 Outside air damper ventilation and recirculation control - H&V Unit

18 Dual Duct air handling unit

DDC Function

19 Scheduled start/stop control - AHU w/ Return Fan
Optimum start/stop control - AHU w/ Return Fan
Demand limiting - AHU w/ Return Fan
Night setback - AHU w/ Return Fan
28 Direct digital control - Dual Duct AHU
34 Outside air damper ventilation and recirculation control - Dual Duct AHU
37 Outside air damper economizer control - Dual Duct AHU
40 Maintenance (filter) alarm

19 Fan coil unit

DDC Function

20 Scheduled start/stop control - Unitary Equip
Optimum start/stop control - Unitary Equip
Night setback - Unitary Equip

SYSTEM FUNCTION DESCRIPTION

System No.

20 Infrared Radiant Heaters

DDC Function

20 Scheduled start/stop control - Unitary Equip
Optimum start/stop control - Unitary Equip
Night setback - Unitary Equip

21 HW Unit heater

DDC Function

20 Scheduled start/stop control - Unitary Equip
Optimum start/stop control - Unitary Equip
Night setback - Unitary Equip

22 Heat pump unit

DDC Function

20 Scheduled start/stop control - Unitary Equip
Optimum start/stop control - Unitary Equip
Night setback - Unitary Equip

23 Ventilation fan

DDC Function

21 Scheduled start/stop control - Ventilation Fan
Optimum start/stop control - Ventilation Fan
Night setback - Ventilation Fan

24 Dual temperature water pump

DDC Function

22 Scheduled start/stop control - DTW Pump
Optimum start/stop control - DTW Pump
Demand limiting - DTW Pump
Night setback - DTW Pump

SYSTEM FUNCTION DESCRIPTION

System No.

25 Hot water radiation pump

DDC Function
23 Scheduled start/stop control - HW Pump
Optimum start/stop control - HW Pump
Night setback - HW Pump

26 Pump

DDC Function
24 Scheduled start/stop control - Pump
Optimum start/stop control - Pump
Night setback - Pump

27 Perimeter radiation valve

DDC Function
25 Optimum start/stop control - Perimeter Radiation Valve
Night setback - Perimeter Radiation Valve

28 Domestic Hot Water Storage Tank

DDC Function
44 Optimum start/stop control - DHW Storage Tank

29 Water Level Alarm

30 Cold Storage - Bldg. 650

31 Cold Storage - Bldg. 652

32 Pneumatic Control Air

33 Multizone AHU with Humidification

DDC Function
18 Selected start/stop control - AHU;
Optimum start/stop - AHU demand limiting - AHU;
Duty Cycling - AHU; Night Setback - AHU
38 Direct Digital Control-Multizone AHU w/humidification
33 Outside air damper ventilation and recirculation control - AHU

35 Outside air damper ecoomizer control - MZ AHU
40 Maintenance (filter) alarm - AHU

Table F-1 on page F-13 presents the system economics listed by building. The table includes the UMCS functions, energy savings, costs, and economic summaries for the HVAC systems on a function-by-function basis.

Table F-1. System Economics Listed By Building

BLD NO	[illegible]	[illegible] TAG	TYPE	[illegible] NUMBER	KW SVGS. PER YR	KWH SVGS. PER YR	[illegible] SVGS PER YR	LABOR HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	[illegible] PNT	[illegible] PNT	[illegible] PNT	[illegible] PNT	TOTAL CONSTR COST	[illegible] PER YR	[illegible] DISC SAVINGS	[illegible]	[illegible]
0003	POST CHAPEL	AHU-1	15	18	1	6,829	0.0	0	0	$295	1	0	0	1	$348	$0	$2,589	7.44	1.18
0003	POST CHAPEL	AHU-1	15	27	0	3,380	0.0	0	0	$140	0	2	0	3	$1,097	$0	$1,226	1.12	7.86
0003	POST CHAPEL	AHU-2	16	18	0	8,669	177.2	0	0	$1,088	1	0	0	1	$348	$0	$10,099	29.02	0.32
0003	POST CHAPEL	AHU-2	16	30	0	0	93.5	0	0	$385	0	1	0	3	$813	$0	$3,672	4.52	2.11
0003	POST CHAPEL	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0003	POST CHAPEL	CT-1	26	24	0	3,030	0.0	3	0	$197	1	0	1	0	$386	$0	$1,713	4.44	1.96
0006	POST CHAPEL	AHU-1	15	18	3	14,463	139.4	0	0	$1,251	1	0	0	1	$348	$0	$11,398	32.75	0.28
0006	POST CHAPEL	AHU-1	15	27	0	2,770	23.1	0	0	$210	0	2	0	3	$1,097	$0	$1,912	1.74	5.23
0006	POST CHAPEL	AHU-1	15	33	0	108	6.0	0	0	$29	0	1	0	0	$272	$0	$275	1.01	9.32
0006	POST CHAPEL	AHU-1	15	36	0	1,427	0.0	0	0	$59	0	0	0	2	$399	$0	$518	1.30	6.77
0006	POST CHAPEL	AHU-2	15	18	3	14,463	139.4	0	0	$1,251	1	0	0	1	$348	$0	$11,398	32.75	0.28
0006	POST CHAPEL	AHU-2	15	27	0	2,770	23.1	0	0	$210	0	2	0	3	$1,097	$0	$1,912	1.74	5.23
0006	POST CHAPEL	AHU-2	15	33	0	108	6.0	0	0	$29	0	1	0	0	$272	$0	$275	1.01	9.32
0006	POST CHAPEL	AHU-2	15	36	0	1,427	0.0	0	0	$59	0	0	0	2	$399	$0	$518	1.30	6.77
0006	POST CHAPEL	AHU-3	15	18	0	1,393	7.6	0	0	$89	1	0	0	1	$348	$0	$803	2.31	3.92
0006	POST CHAPEL	AHU-3	15	27	0	623	6.6	0	0	$53	0	2	0	3	$1,097	$0	$485	0.44	20.72
0006	POST CHAPEL	BLR-1	1	1	0	856	0.0	0	0	$35	2	0	0	0	$277	$0	$310	1.12	7.83
0006	POST CHAPEL	BLR-1	1	2	0	0	4.3	0	0	$18	0	0	0	3	$836	$0	$167	0.20	47.72
0006	POST CHAPEL	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0006	POST CHAPEL	CT-1	26	24	1	3,833	0.0	3	0	$260	1	0	1	0	$386	$0	$2,259	5.85	1.48
0027	OFF QTRS MILIT	BLR-1	1	2	0	0	2.8	0	0	$12	0	0	0	3	$836	$0	$111	0.13	71.57
0027	OFF QTRS MILIT	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0027	OFF QTRS MILIT	BLR-2	1	2	0	0	2.3	0	0	$9	0	0	0	3	$836	$0	$89	0.11	89.47
0027	OFF QTRS MILIT	BLR-2	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0027	OFF QTRS MILIT	CWP-1	26	24	3	0	0.0	3	0	$143	1	0	1	0	$386	$0	$1,222	3.17	2.69
0027	OFF QTRS MILIT	CWP-2	26	24	3	0	0.0	3	0	$143	1	0	1	0	$386	$0	$1,222	3.17	2.69
0029	RED CROSS BLDG	AHU-1	15	18	1	11,826	197.6	0	0	$1,326	1	0	0	1	$348	$0	$12,248	35.20	0.26
0029	RED CROSS BLDG	AHU-1	15	27	0	2,170	51.8	0	0	$303	0	2	0	3	$1,097	$0	$2,822	2.57	3.62
0029	RED CROSS BLDG	AHU-2	15	18	1	7,894	131.8	0	0	$885	1	0	0	1	$348	$0	$8,170	23.48	0.39
0029	RED CROSS BLDG	AHU-2	15	27	0	1,447	34.5	0	0	$202	0	2	0	3	$1,097	$0	$1,881	1.71	5.43
0029	RED CROSS BLDG	CH-1	8	17	5	105	0.0	3	0	$205	1	0	1	0	$243	$0	$1,750	7.20	1.19
0029	RED CROSS BLDG	CH-2	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
0200	ADMIN GEN PURP	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0200	ADMIN GEN PURP	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0200	ADMIN GEN PURP	CT-1	26	24	0	1,115	0.0	3	0	$118	1	0	1	0	$386	$0	$1,019	2.64	3.27
0200	ADMIN GEN PURP	CT-2	26	24	0	263	0.0	3	0	$83	1	0	1	0	$386	$0	$710	1.84	4.66
0200	ADMIN GEN PURP	HP-1	22	20	0	63,307	444.4	0	0	$4,445	1	0	1	2	$1,213	$0	$40,403	33.31	0.27
0200	ADMIN GEN PURP	HP-2	22	20	0	34,838	222.2	0	0	$2,354	1	0	1	2	$1,213	$0	$21,356	17.61	0.52

0200	ADMIN GEN PURP	HP-3	22	20	0	32,027	222.2	0	0	$2,238	1	0	1	2	$1,213	$0	$20,337	16.77	0.54
0200	ADMIN GEN PURP	HP-4	22	20	0	46,793	222.2	0	0	$2,848	1	0	1	2	$1,213	$0	$25,691	21.18	0.43
0200	ADMIN GEN PURP	HP-5	22	20	0	37,910	222.2	0	0	$2,481	1	0	1	2	$1,213	$0	$22,470	18.52	0.49
0200	ADMIN GEN PURP	HP-6	22	20	0	54,065	777.8	0	0	$5,437	1	0	1	2	$1,213	$0	$50,142	41.34	0.22
0200	ADMIN GEN PURP	HWP-1	26	24	0	9,947	0.0	3	0	$483	1	0	1	0	$386	$0	$4,221	10.94	0.80
0200	ADMIN GEN PURP	HWP-2	26	24	0	9,947	0.0	3	0	$483	1	0	1	0	$386	$0	$4,221	10.94	0.80
0202	PHYS FITNESS CTR	AHU-1	15	18	1	2,425	0.0	0	0	$130	1	0	0	1	$348	$0	$1,134	3.26	2.68
0202	PHYS FITNESS CTR	AHU-2	13	18	7	53,960	412.7	0	0	$4,119	1	0	0	1	$348	$0	$37,391	107.45	0.08
0202	PHYS FITNESS CTR	AHU-2	13	26	0	1,435	7.3	0	0	$89	0	2	0	4	$1,281	$0	$808	0.63	14.31
0202	PHYS FITNESS CTR	AHU-2	13	33	0	120	11.8	0	0	$54	0	1	0	0	$272	$0	$507	1.86	5.08
0202	PHYS FITNESS CTR	AHU-2	13	36	0	833	0.0	0	0	$34	0	0	0	2	$399	$0	$302	0.76	11.60
0202	PHYS FITNESS CTR	AHU-2	13	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0202	PHYS FITNESS CTR	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0202	PHYS FITNESS CTR	CH-1	7	12	0	788	0.0	0	0	$33	0	0	0	4	$1,133	$0	$286	0.25	34.84
0202	PHYS FITNESS CTR	CH-1	7	16	0	0	0.0	6	0	$144	0	0	2	0	$281	$0	$1,228	4.37	1.95
0202	PHYS FITNESS CTR	CH-1	7	43	38	0	0.0	0	0	$965	5	0	0	0	$530	$0	$8,230	15.53	0.55
0202	PHYS FITNESS CTR	CT-1	26	24	0	2,470	0.0	3	0	$174	1	0	1	0	$386	$0	$1,510	3.91	2.22
0202	PHYS FITNESS CTR	UH-1	16	18	0	2,846	453.8	0	0	$1,987	1	0	0	1	$348	$0	$18,851	54.17	0.18
0202	PHYS FITNESS CTR	UH-1	16	30	0	0	11.7	0	0	$48	0	1	0	3	$813	$0	$461	0.57	16.80
0202	PHYS FITNESS CTR	UH-2	16	18	0	2,846	453.8	0	0	$1,987	1	0	0	1	$348	$0	$18,851	54.17	0.18
0202	PHYS FITNESS CTR	UH-2	16	30	0	0	11.7	0	0	$48	0	1	0	3	$813	$0	$461	0.57	16.80
0202	PHYS FITNESS CTR	UH-3	16	18	0	3,601	312.0	0	0	$1,434	1	0	0	1	$348	$0	$13,556	38.95	0.24
0202	PHYS FITNESS CTR	UH-3	16	30	0	0	8.1	0	0	$33	0	1	0	3	$813	$0	$317	0.39	24.44
0202	PHYS FITNESS CTR	UH-4	16	18	0	2,846	595.7	0	0	$2,572	1	0	0	1	$348	$0	$24,420	70.17	0.14
0202	PHYS FITNESS CTR	UH-4	16	30	0	0	15.4	0	0	$64	0	1	0	3	$813	$0	$605	0.74	12.80
0202	PHYS FITNESS CTR	UH-5	16	18	0	2,846	453.8	0	0	$1,987	1	0	0	1	$348	$0	$18,851	54.17	0.18
0202	PHYS FITNESS CTR	UH-5	16	30	0	0	11.7	0	0	$48	0	1	0	3	$813	$0	$461	0.57	16.80
0203	CAVALRY MUSEUM	AHU-1	14	18	0	44,879	482.1	0	0	$3,840	1	0	0	1	$348	$0	$35,205	101.16	0.09
0203	CAVALRY MUSEUM	AHU-1	14	31	0	5,015	97.6	0	0	$609	0	3	0	5	$1,849	$0	$5,651	3.06	3.03
0203	CAVALRY MUSEUM	AHU-1	14	33	0	0	8.8	0	0	$36	0	1	0	0	$272	$0	$346	1.27	7.49
0203	CAVALRY MUSEUM	AHU-1	14	36	0	290	0.0	0	0	$12	0	0	0	2	$399	$0	$105	0.26	33.27
0203	CAVALRY MUSEUM	AHU-1	14	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0203	CAVALRY MUSEUM	CH-1	7	10	2	6,924	0.0	0	0	$335	1	0	1	0	$386	$0	$2,927	7.58	1.15
0203	CAVALRY MUSEUM	CH-1	7	12	0	1,050	0.0	0	0	$43	0	0	0	4	$1,133	$0	$381	0.34	26.13
0203	CAVALRY MUSEUM	CH-1	7	16	0	0	0.0	6	0	$144	0	0	2	0	$281	$0	$1,228	4.37	1.95
0203	CAVALRY MUSEUM	CH-1	7	43	50	0	0.0	0	0	$1,286	5	0	0	0	$530	$0	$10,974	20.71	0.41
0203	CAVALRY MUSEUM	CWP-1	26	24	2	6,266	0.0	3	0	$375	1	0	1	0	$386	$0	$3,263	8.45	1.03
0205	CAVALRY MUSEUM	AHU-1	14	18	0	64,674	735.6	0	0	$5,702	1	0	0	1	$348	$0	$52,334	150.38	0.06
0205	CAVALRY MUSEUM	AHU-1	14	31	0	12,948	148.2	0	0	$1,145	0	3	0	5	$1,849	$0	$10,515	5.69	1.61
0205	CAVALRY MUSEUM	AHU-1	14	33	0	0	14.5	0	0	$60	0	1	0	0	$272	$0	$569	2.09	4.55
0205	CAVALRY MUSEUM	AHU-1	14	36	0	750	0.0	0	0	$31	0	0	0	2	$399	$0	$272	0.68	12.88

BLDG NO	[illegible]	[illegible]	[illegible] TYPE	[illegible]	[illegible] SVGS. PER YR	KWH SVGS. PER YR	MBTU SVGB. PER YR	LABOR HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL CONSTR COST	[illegible] COSTS PER YR	[illegible] DISC SAVINGS	[illegible]	[illegible]
0205	CAVALRY MUSEUM	AHU-1	14	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0205	CAVALRY MUSEUM	AHU-2	14	18	0	36,922	242.6	0	0	$2,524	1	0	0	1	$348	$0	$22,914	65.84	0.14
0205	CAVALRY MUSEUM	AHU-2	14	31	0	7,042	79.8	0	0	$620	0	3	0	5	$1,849	$0	$5,687	3.08	2.98
0205	CAVALRY MUSEUM	AHU-2	14	36	0	408	0.0	0	0	$17	0	0	0	2	$399	$0	$148	0.37	23.69
0205	CAVALRY MUSEUM	AHU-2	14	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0205	CAVALRY MUSEUM	CWP-1	26	24	3	9,526	0.0	3	0	$537	1	0	1	0	$386	$0	$4,676	12.12	0.72
0205	CAVALRY MUSEUM	HWP-1	26	24	0	9,031	0.0	3	0	$445	1	0	1	0	$386	$0	$3,889	10.08	0.87
0206	ADMIN GEN PURP	AHU-1	13	18	7	67,553	941.2	0	0	$6,858	1	0	0	1	$348	$0	$63,070	181.24	0.05
0206	ADMIN GEN PURP	AHU-1	13	26	0	27,063	358.2	0	0	$2,593	0	2	0	4	$1,281	$0	$23,878	18.64	0.49
0206	ADMIN GEN PURP	AHU-1	13	33	0	364	16.4	0	0	$83	0	1	0	0	$272	$0	$777	2.86	3.29
0206	ADMIN GEN PURP	AHU-1	13	36	0	7,279	0.0	0	0	$301	0	0	0	2	$399	$0	$2,639	6.61	1.33
0206	ADMIN GEN PURP	AHU-1	13	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0206	ADMIN GEN PURP	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0206	ADMIN GEN PURP	CH-1	7	12	0	875	0.0	0	0	$36	0	0	0	4	$1,133	$0	$317	0.28	31.35
0206	ADMIN GEN PURP	CH-1	7	16	0	0	0.0	6	0	$144	0	0	2	0	$281	$0	$1,228	4.37	1.95
0206	ADMIN GEN PURP	CH-1	7	43	42	0	0.0	0	0	$1,072	5	0	0	0	$530	$0	$9,145	17.25	0.49
0207	CAVALRY MUSEUM	AHU-1	14	18	0	8,727	71.3	0	0	$654	1	0	0	1	$348	$0	$5,963	17.14	0.53
0207	CAVALRY MUSEUM	AHU-1	14	31	0	543	19.5	0	0	$103	0	3	0	5	$1,849	$0	$961	0.52	18.02
0207	CAVALRY MUSEUM	AHU-1	14	33	0	0	0.6	0	0	$2	0	1	0	0	$272	$0	$22	0.08	119.79
0207	CAVALRY MUSEUM	AHU-1	14	36	0	31	0.0	0	0	$1	0	0	0	2	$399	$0	$11	0.03	307.09
0207	CAVALRY MUSEUM	AHU-1	14	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0207	CAVALRY MUSEUM	AHU-2	14	18	0	12,270	87.5	0	0	$867	1	0	0	1	$348	$0	$7,883	22.65	0.40
0207	CAVALRY MUSEUM	AHU-2	14	31	0	1,266	19.5	0	0	$132	0	3	0	5	$1,849	$0	$1,223	0.66	13.96
0207	CAVALRY MUSEUM	AHU-2	14	33	0	0	1.3	0	0	$5	0	1	0	0	$272	$0	$50	0.19	51.39
0207	CAVALRY MUSEUM	AHU-2	14	36	0	73	0.0	0	0	$3	0	0	0	2	$399	$0	$27	0.07	131.76
0207	CAVALRY MUSEUM	AHU-2	14	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0207	CAVALRY MUSEUM	AHU-3	14	18	0	16,904	97.5	0	0	$1,100	1	0	0	1	$348	$0	$9,956	28.61	0.32
0207	CAVALRY MUSEUM	AHU-3	14	31	0	1,713	19.5	0	0	$151	0	3	0	5	$1,849	$0	$1,385	0.75	12.25
0207	CAVALRY MUSEUM	AHU-3	14	33	0	0	1.7	0	0	$7	0	1	0	0	$272	$0	$58	0.25	37.98
0207	CAVALRY MUSEUM	AHU-3	14	36	0	99	0.0	0	0	$4	0	0	0	2	$399	$0	$36	0.09	97.37
0207	CAVALRY MUSEUM	AHU-3	14	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0207	CAVALRY MUSEUM	AHU-4	14	18	0	16,494	92.1	0	0	$1,061	1	0	0	1	$348	$0	$9,598	27.58	0.33
0207	CAVALRY MUSEUM	AHU-4	14	31	0	1,630	18.3	0	0	$143	0	3	0	5	$1,849	$0	$1,310	0.71	12.95
0207	CAVALRY MUSEUM	AHU-4	14	33	0	0	1.7	0	0	$7	0	1	0	0	$272	$0	$65	0.24	39.93
0207	CAVALRY MUSEUM	AHU-4	14	36	0	94	0.0	0	0	$4	0	0	0	2	$399	$0	$34	0.09	102.37
0207	CAVALRY MUSEUM	AHU-4	14	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0207	CAVALRY MUSEUM	AHU-5	14	18	0	17,436	99.9	0	0	$1,132	1	0	0	1	$348	$0	$10,245	29.44	0.31
0207	CAVALRY MUSEUM	AHU-5	14	31	0	1,822	19.5	0	0	$155	0	3	0	5	$1,849	$0	$1,424	0.77	11.90
0207	CAVALRY MUSEUM	AHU-5	14	33	0	0	1.8	0	0	$8	0	1	0	0	$272	$0	$73	0.27	35.72
0207	CAVALRY MUSEUM	AHU-5	14	36	0	106	0.0	0	0	$4	0	0	0	2	$399	$0	$38	0.10	91.56
0207	CAVALRY MUSEUM	AHU-5	14	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] SVGS PER YR	KWH SVGS PER YR	[illegible] SVGS PER YR	LABOR HOUR SVGS PER YR	MATRL SAVGS PER YR	COST SVGS PER YR	DO PNT	AU PNT	DI PNT	AL PNT	[illegible] CONSTR COST	[illegible] COST PER YR	[illegible]	[illegible]	[illegible]
0207	CAVALRY MUSEUM	AHU-6	14	18	0	17,293	95.8	0	0	$1,109	1	0	0	1	$348	$0	$10,030	28.82	0.31
0207	CAVALRY MUSEUM	AHU-6	14	31	0	1,793	18.3	0	0	$149	0	3	0	5	$1,849	$0	$1,369	0.74	12.37
0207	CAVALRY MUSEUM	AHU-6	14	33	0	0	1.8	0	0	$7	0	1	0	0	$272	$0	$71	0.26	36.30
0207	CAVALRY MUSEUM	AHU-6	14	36	0	104	0.0	0	0	$4	0	0	0	2	$399	$0	$38	0.09	93.06
0207	CAVALRY MUSEUM	AHU-6	14	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0207	CAVALRY MUSEUM	BLR-1	1	1	0	5,751	0.0	0	0	$238	2	0	0	0	$277	$0	$2,086	7.53	1.17
0207	CAVALRY MUSEUM	BLR-1	1	2	0	0	3.0	0	0	$12	0	0	0	3	$836	$0	$117	0.14	68.17
0207	CAVALRY MUSEUM	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0207	CAVALRY MUSEUM	CH-1	7	10	1	4,850	0.0	0	0	$233	1	0	1	0	$386	$0	$2,038	5.28	1.66
0207	CAVALRY MUSEUM	CH-1	7	12	0	525	0.0	0	0	$22	0	0	0	4	$1,133	$0	$190	0.17	52.25
0207	CAVALRY MUSEUM	CH-1	7	16	0	0	0.0	6	0	$144	0	0	2	0	$281	$0	$1,228	4.37	1.95
0207	CAVALRY MUSEUM	CH-1	7	43	25	0	0.0	0	0	$643	5	0	0	0	$530	$0	$5,487	10.35	0.82
0207	CAVALRY MUSEUM	CWP-1	26	24	1	4,415	0.0	3	0	$284	1	0	1	0	$386	$0	$2,469	6.40	1.36
0207	CAVALRY MUSEUM	HWP-1	26	24	0	5,363	0.0	3	0	$293	1	0	1	0	$386	$0	$2,559	6.63	1.32
0210	MILIT PERS BLDG	AHU-1	10	18	14	224,779	1,155.7	0	0	$14,407	1	0	0	1	$348	$0	$129,971	373.48	0.02
0210	MILIT PERS BLDG	AHU-1	10	29	0	51,434	110.1	0	0	$2,578	0	7	0	8	$3,378	$0	$22,974	6.80	1.31
0210	MILIT PERS BLDG	AHU-1	10	33	0	0	40.7	0	0	$168	0	1	0	0	$272	$0	$1,598	5.87	1.62
0210	MILIT PERS BLDG	AHU-1	10	35	0	2,978	0.0	0	0	$123	0	0	0	2	$399	$0	$1,080	2.71	3.24
0210	MILIT PERS BLDG	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0210	MILIT PERS BLDG	AHU-2	10	18	14	188,807	924.6	0	0	$11,969	1	0	0	1	$348	$0	$107,851	309.92	0.03
0210	MILIT PERS BLDG	AHU-2	10	29	0	41,147	88.1	0	0	$2,062	0	7	0	8	$3,378	$0	$18,379	5.44	1.64
0210	MILIT PERS BLDG	AHU-2	10	33	0	0	32.6	0	0	$134	0	1	0	0	$272	$0	$1,278	4.70	2.03
0210	MILIT PERS BLDG	AHU-2	10	35	0	2,383	0.0	0	0	$98	0	0	0	2	$399	$0	$864	2.17	4.05
0210	MILIT PERS BLDG	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0210	MILIT PERS BLDG	AHU-3	13	18	11	135,955	863.5	0	0	$9,452	1	0	0	1	$348	$0	$85,591	245.95	0.04
0210	MILIT PERS BLDG	AHU-3	13	26	0	28,931	132.1	0	0	$1,739	0	2	0	4	$1,281	$0	$15,679	12.24	0.74
0210	MILIT PERS BLDG	AHU-3	13	33	0	0	22.9	0	0	$94	0	1	0	0	$272	$0	$899	3.30	2.88
0210	MILIT PERS BLDG	AHU-3	13	36	0	1,675	0.0	0	0	$69	0	0	0	2	$399	$0	$608	1.52	5.77
0210	MILIT PERS BLDG	AHU-3	13	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0210	MILIT PERS BLDG	AHU-4	15	18	3	24,871	175.5	0	0	$1,830	1	0	0	1	$348	$0	$16,589	47.67	0.19
0210	MILIT PERS BLDG	AHU-4	15	27	0	4,286	35.2	0	0	$322	0	2	0	3	$1,097	$0	$2,938	2.68	3.40
0210	MILIT PERS BLDG	AHU-4	15	33	0	0	3.4	0	0	$14	0	1	0	0	$272	$0	$133	0.49	19.47
0210	MILIT PERS BLDG	AHU-4	15	36	0	248	0.0	0	0	$10	0	0	0	2	$399	$0	$90	0.23	38.92
0210	MILIT PERS BLDG	AHU-5	15	18	5	33,746	154.2	0	0	$2,147	1	0	0	1	$348	$0	$19,295	55.45	0.16
0210	MILIT PERS BLDG	AHU-5	15	27	0	5,465	22.0	0	0	$316	0	2	0	3	$1,097	$0	$2,846	2.59	3.47
0210	MILIT PERS BLDG	AHU-5	15	33	0	0	4.3	0	0	$18	0	1	0	0	$272	$0	$170	0.62	15.27
0210	MILIT PERS BLDG	AHU-5	15	36	0	316	0.0	0	0	$13	0	0	0	2	$399	$0	$115	0.29	30.53
0210	MILIT PERS BLDG	AHU-6	10	18	7	68,581	365.9	0	0	$4,530	1	0	0	1	$348	$0	$40,857	117.40	0.08
0210	MILIT PERS BLDG	AHU-6	10	29	0	12,858	52.9	0	0	$749	0	7	0	8	$3,378	$0	$6,738	1.99	4.51
0210	MILIT PERS BLDG	AHU-6	10	33	0	0	10.2	0	0	$42	0	1	0	0	$272	$0	$399	1.47	6.49
0210	MILIT PERS BLDG	AHU-6	10	35	0	745	0.0	0	0	$31	0	0	0	2	$399	$0	$270	0.68	12.97

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	KW SVGS. PER YR	KWH SVGS. PER YR	[illegible] SVGS. PER YR	LABOR HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	[illegible] PNT	[illegible] PNT	[illegible] PNT	[illegible]	CONSTR COST	RECUR COSTS PER YR	[illegible] SAVINGS	[illegible]	[illegible]
0210	MILIT PERS BLDG	AHU-6	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0210	MILIT PERS BLDG	BLR-1	1	1	0	29,847	0.0	0	0	$1,233	2	0	0	0	$277	$0	$10,823	39.07	0.22
0210	MILIT PERS BLDG	BLR-1	1	2	0	0	13.6	0	0	$56	0	0	0	3	$836	$0	$533	0.64	14.96
0210	MILIT PERS BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0210	MILIT PERS BLDG	CH-1	7	10	5	18,537	0.0	0	0	$901	1	0	1	0	$386	$0	$7,878	20.41	0.43
0210	MILIT PERS BLDG	CH-1	7	12	0	2,275	0.0	0	0	$94	0	0	0	4	$1,133	$0	$825	0.73	12.06
0210	MILIT PERS BLDG	CH-1	7	16	0	0	0.0	6	0	$144	0	0	2	0	$281	$0	$1,228	4.37	1.95
0210	MILIT PERS BLDG	CH-1	7	43	109	0	0.0	0	0	$2,787	5	0	0	0	$530	$0	$23,776	44.86	0.19
0211	ADMIN	ACCU-1	8	17	3	53	0.0	3	0	$138	1	0	1	0	$243	$0	$1,182	4.86	1.75
0211	ADMIN	AHU-1	15	18	0	4,752	94.1	0	0	$584	1	0	0	1	$348	$0	$5,416	15.56	0.60
0211	ADMIN	AHU-1	15	27	0	0	30.9	0	0	$127	0	2	0	3	$1,097	$0	$1,215	1.11	8.60
0211	ADMIN	AHU-2	15	18	1	5,286	0.0	0	0	$235	1	0	0	1	$348	$0	$2,060	5.92	1.48
0211	ADMIN	AHU-2	15	27	0	5,494	0.0	0	0	$227	0	2	0	3	$1,097	$0	$1,992	1.82	4.84
0211	ADMIN	AHU-2	15	36	0	317	0.0	0	0	$13	0	0	0	2	$399	$0	$115	0.29	30.47
0211	ADMIN	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0211	ADMIN	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0211	ADMIN	RAD-1	27	25	0	0	0.0	3	0	$72	0	1	0	1	$456	$0	$614	1.35	6.33
0211	ADMIN	RAD-1	27	25	0	0	0.0	3	0	$72	0	1	0	1	$456	$0	$614	1.35	6.33
0214	ENL BARRACKS W/AS	AHU-1	10	18	7	0	35.2	0	0	$335	1	0	0	1	$348	$0	$3,003	8.63	1.04
0214	ENL BARRACKS W/AS	AHU-1	10	29	0	7,934	70.0	0	0	$616	0	7	0	8	$3,378	$0	$5,625	1.67	5.48
0214	ENL BARRACKS W/AS	AHU-1	10	35	0	8,954	0.0	0	0	$370	0	0	0	2	$399	$0	$3,247	8.14	1.08
0214	ENL BARRACKS W/AS	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0214	ENL BARRACKS W/AS	AHU-2	10	18	7	0	35.2	0	0	$335	1	0	0	1	$348	$0	$3,003	8.63	1.04
0214	ENL BARRACKS W/AS	AHU-2	10	29	0	7,871	70.0	0	0	$613	0	7	0	8	$3,378	$0	$5,602	1.66	5.51
0214	ENL BARRACKS W/AS	AHU-2	10	35	0	8,882	0.0	0	0	$367	0	0	0	2	$399	$0	$3,221	8.07	1.09
0214	ENL BARRACKS W/AS	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0214	ENL BARRACKS W/AS	AHU-3	15	18	2	0	4.5	0	0	$64	1	0	0	1	$348	$0	$561	1.61	5.48
0214	ENL BARRACKS W/AS	AHU-3	15	27	0	862	9.0	0	0	$73	0	2	0	3	$1,097	$0	$667	0.61	15.06
0214	ENL BARRACKS W/AS	AHU-3	15	36	0	973	0.0	0	0	$40	0	0	0	2	$399	$0	$353	0.88	9.93
0214	ENL BARRACKS W/AS	AHU-4	15	18	2	0	10.2	0	0	$87	1	0	0	1	$348	$0	$783	2.25	4.00
0214	ENL BARRACKS W/AS	AHU-4	15	27	0	1,882	20.3	0	0	$161	0	2	0	3	$1,097	$0	$1,480	1.35	6.80
0214	ENL BARRACKS W/AS	AHU-4	15	36	0	2,123	0.0	0	0	$88	0	0	0	2	$399	$0	$770	1.93	4.55
0214	ENL BARRACKS W/AS	AHU-5	15	18	2	0	11.3	0	0	$92	1	0	0	1	$348	$0	$828	2.38	3.80
0214	ENL BARRACKS W/AS	AHU-5	15	27	0	2,195	22.6	0	0	$184	0	2	0	3	$1,097	$0	$1,683	1.53	5.97
0214	ENL BARRACKS W/AS	AHU-5	15	36	0	2,477	0.0	0	0	$102	0	0	0	2	$399	$0	$898	2.25	3.90
0214	ENL BARRACKS W/AS	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0214	ENL BARRACKS W/AS	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0214	ENL BARRACKS W/AS	CH-1	7	10	2	0	0.0	0	0	$44	1	0	1	0	$386	$0	$377	0.98	8.74
0214	ENL BARRACKS W/AS	CH-1	7	12	0	1,225	0.0	0	0	$51	0	0	0	4	$1,133	$0	$444	0.39	22.39
0214	ENL BARRACKS W/AS	CH-1	7	16	0	0	0.0	6	0	$144	0	0	2	0	$281	$0	$1,228	4.37	1.95
0214	ENL BARRACKS W/AS	CH-1	7	43	59	0	0.0	0	0	$1,501	5	0	0	0	$530	$0	$12,803	24.16	0.35

BLDG NO	[illegible]	ID	SYS TYPE	[illegible]	KW SVGS PER YR	KWH SVGS PER YR	MBTU SVGS PER YR	LABOR HOUR SVGS PER YR	MATRL SAVGS PER YR	COST SVGS PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL CONSTR COST	RECUR COSTS PER YR	TOTAL DISC SAVINGS	SIR	SIMPLE PAYBACK
0214	ENL BARRACKS W/AS	RAD-1	27	25	0	0	0.0	3	0	$72	0	1	0	1	$456	$0	$614	1.35	6.33
0222	ADMIN GEN PURP	AHU-1	15	18	7	46,786	388.4	0	0	$3,723	1	0	0	1	$348	$0	$33,837	97.23	0.09
0222	ADMIN GEN PURP	AHU-1	15	27	0	16,172	85.3	0	0	$1,019	0	2	0	3	$1,097	$0	$9,212	8.40	1.08
0222	ADMIN GEN PURP	AHU-1	15	33	0	0	8.3	0	0	$34	0	1	0	0	$272	$0	$326	1.20	7.95
0222	ADMIN GEN PURP	AHU-1	15	36	0	936	0.0	0	0	$39	0	0	0	2	$399	$0	$340	0.85	10.32
0222	ADMIN GEN PURP	BLR-1	1	1	0	870	0.0	0	0	$36	2	0	0	0	$277	$0	$315	1.14	7.71
0222	ADMIN GEN PURP	BLR-1	1	2	0	0	2.5	0	0	$10	0	0	0	3	$836	$0	$97	0.12	82.46
0222	ADMIN GEN PURP	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0222	ADMIN GEN PURP	CH-1	6	10	2	4,816	0.0	0	0	$243	1	0	1	0	$386	$0	$2,123	5.50	1.59
0222	ADMIN GEN PURP	CH-1	6	11	0	525	0.0	0	0	$22	0	0	0	2	$664	$0	$190	0.29	30.62
0222	ADMIN GEN PURP	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
0222	ADMIN GEN PURP	CH-1	6	42	25	0	0.0	0	0	$643	1	0	0	0	$150	$0	$5,487	36.58	0.23
0222	ADMIN GEN PURP	RAD-1	25	23	0	240	0.0	3	0	$82	1	0	1	1	$570	$0	$701	1.23	6.96
0223	ENL BARRACKS W/DAS	AHU-1	10	18	11	0	40.3	0	0	$446	1	0	0	1	$348	$0	$3,972	11.41	0.78
0223	ENL BARRACKS W/DAS	AHU-1	10	29	0	5,841	80.3	0	0	$572	0	7	0	8	$3,378	$0	$5,269	1.56	5.91
0223	ENL BARRACKS W/DAS	AHU-1	10	35	0	6,591	0.0	0	0	$272	0	0	0	2	$399	$0	$2,390	5.99	1.47
0223	ENL BARRACKS W/DAS	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0223	ENL BARRACKS W/DAS	AHU-2	10	18	11	0	38.9	0	0	$440	1	0	0	1	$348	$0	$3,916	11.25	0.79
0223	ENL BARRACKS W/DAS	AHU-2	10	29	0	5,606	77.4	0	0	$550	0	7	0	8	$3,378	$0	$5,071	1.50	6.14
0223	ENL BARRACKS W/DAS	AHU-2	10	35	0	6,326	0.0	0	0	$261	0	0	0	2	$399	$0	$2,294	5.75	1.53
0223	ENL BARRACKS W/DAS	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0223	ENL BARRACKS W/DAS	AHU-3	10	18	7	0	20.2	0	0	$273	1	0	0	1	$348	$0	$2,413	6.93	1.27
0223	ENL BARRACKS W/DAS	AHU-3	10	29	0	3,920	40.1	0	0	$327	0	7	0	8	$3,378	$0	$2,997	0.89	10.32
0223	ENL BARRACKS W/DAS	AHU-3	10	35	0	4,424	0.0	0	0	$183	0	0	0	2	$399	$0	$1,604	4.02	2.18
0223	ENL BARRACKS W/DAS	AHU-3	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0223	ENL BARRACKS W/DAS	AHU-4	10	18	7	0	15.8	0	0	$255	1	0	0	1	$348	$0	$2,244	6.45	1.36
0223	ENL BARRACKS W/DAS	AHU-4	10	29	0	3,136	31.5	0	0	$259	0	7	0	8	$3,378	$0	$2,375	0.70	13.02
0223	ENL BARRACKS W/DAS	AHU-4	10	35	0	3,539	0.0	0	0	$146	0	0	0	2	$399	$0	$1,283	3.22	2.73
0223	ENL BARRACKS W/DAS	AHU-4	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0223	ENL BARRACKS W/DAS	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0223	ENL BARRACKS W/DAS	CH-1	7	10	1	0	0.0	0	0	$17	1	0	1	0	$386	$0	$143	0.37	22.96
0223	ENL BARRACKS W/DAS	CH-1	7	12	0	1,225	0.0	0	0	$51	0	0	0	4	$1,133	$0	$444	0.39	22.39
0223	ENL BARRACKS W/DAS	CH-1	7	16	0	0	0.0	6	0	$144	0	0	2	0	$281	$0	$1,228	4.37	1.95
0223	ENL BARRACKS W/DAS	CH-1	7	43	59	0	0.0	0	0	$1,501	5	0	0	0	$530	$0	$12,803	24.16	0.35
0223	ENL BARRACKS W/DAS	RAD-1	27	25	0	0	0.0	3	0	$72	0	1	0	1	$456	$0	$614	1.35	6.33
0223	ENL BARRACKS W/DAS	UH-1	21	20	0	0	8.6	0	0	$36	1	0	1	2	$1,213	$0	$339	0.28	34.06
0223	ENL BARRACKS W/DAS	UH-2	21	20	0	0	11.5	0	0	$47	1	0	1	2	$1,213	$0	$453	0.37	25.54
0227	ENL BARRACKS W/AS	AHU-1	10	18	7	0	38.9	0	0	$351	1	0	0	1	$348	$0	$3,151	9.05	0.99
0227	ENL BARRACKS W/AS	AHU-1	10	29	0	7,934	77.5	0	0	$647	0	7	0	8	$3,378	$0	$5,919	1.75	5.22
0227	ENL BARRACKS W/AS	AHU-1	10	35	0	8,954	0.0	0	0	$370	0	0	0	2	$399	$0	$3,247	8.14	1.08
0227	ENL BARRACKS W/AS	AHU-1	10	40	0	0	0.0	5	0	$120	0	1	0	0	$112	$0	$1,024	9.14	0.93

0227	ENL BARRACKS W/AS	AHU-2	10	18	7	0	38.9	0	0	$351	1	0	0	1	$348	$0	$3,151	9.05	0.99
0227	ENL BARRACKS W/AS	AHU-2	10	29	0	7,871	77.5	0	0	$644	0	7	0	8	$3,378	$0	$5,896	1.75	5.24
0227	ENL BARRACKS W/AS	AHU-2	10	35	0	8,882	0.0	0	0	$367	0	0	0	2	$399	$0	$3,221	8.07	1.09
0227	ENL BARRACKS W/AS	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0227	ENL BARRACKS W/AS	AHU-3	15	18	2	0	3.9	0	0	$61	1	0	0	1	$348	$0	$535	1.54	5.72
0227	ENL BARRACKS W/AS	AHU-3	15	27	0	862	7.7	0	0	$68	0	2	0	3	$1,097	$0	$617	0.56	16.24
0227	ENL BARRACKS W/AS	AHU-3	15	36	0	973	0.0	0	0	$40	0	0	0	2	$399	$0	$353	0.88	9.93
0227	ENL BARRACKS W/AS	AHU-4	15	18	2	0	3.9	0	0	$61	1	0	0	1	$348	$0	$535	1.54	5.72
0227	ENL BARRACKS W/AS	AHU-4	15	27	0	862	7.7	0	0	$68	0	2	0	3	$1,097	$0	$617	0.56	16.24
0227	ENL BARRACKS W/AS	AHU-4	15	36	0	973	0.0	0	0	$40	0	0	0	2	$399	$0	$353	0.88	9.93
0227	ENL BARRACKS W/AS	AHU-5	15	18	2	0	11.7	0	0	$93	1	0	0	1	$348	$0	$841	2.42	3.74
0227	ENL BARRACKS W/AS	AHU-5	15	27	0	2,195	23.2	0	0	$186	0	2	0	3	$1,097	$0	$1,709	1.56	5.88
0227	ENL BARRACKS W/AS	AHU-5	15	36	0	2,477	0.0	0	0	$102	0	0	0	2	$399	$0	$898	2.25	3.90
0227	ENL BARRACKS W/AS	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0227	ENL BARRACKS W/AS	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0227	ENL BARRACKS W/AS	CH-1	6	10	2	0	0.0	0	0	$44	1	0	1	0	$386	$0	$377	0.98	8.74
0227	ENL BARRACKS W/AS	CH-1	6	11	0	1,138	0.0	0	0	$47	0	0	0	2	$664	$0	$412	0.62	14.13
0227	ENL BARRACKS W/AS	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
0227	ENL BARRACKS W/AS	CH-1	6	42	55	0	0.0	0	0	$1,394	1	0	0	0	$150	$0	$11,888	79.25	0.11
0253	DRUG ABUSE CTR	AHU-1	15	18	1	7,366	73.9	0	0	$644	1	0	0	1	$348	$0	$5,873	16.88	0.54
0253	DRUG ABUSE CTR	AHU-1	15	27	0	377	9.7	0	0	$56	0	2	0	3	$1,097	$0	$519	0.47	19.71
0253	DRUG ABUSE CTR	AHU-1	15	33	0	75	3.1	0	0	$16	0	1	0	0	$272	$0	$149	0.55	17.15
0253	DRUG ABUSE CTR	AHU-1	15	36	0	988	0.0	0	0	$41	0	0	0	2	$399	$0	$358	0.90	9.78
0253	DRUG ABUSE CTR	AHU-2	15	18	2	14,496	166.0	0	0	$1,346	1	0	0	1	$348	$0	$12,312	35.38	0.26
0253	DRUG ABUSE CTR	AHU-2	15	27	0	854	20.4	0	0	$119	0	2	0	3	$1,097	$0	$1,112	1.01	9.18
0253	DRUG ABUSE CTR	AHU-2	15	33	0	169	7.0	0	0	$36	0	1	0	0	$272	$0	$337	1.24	7.57
0253	DRUG ABUSE CTR	AHU-2	15	36	0	2,240	0.0	0	0	$93	0	0	0	2	$399	$0	$812	2.04	4.31
0253	DRUG ABUSE CTR	AHU-3	15	18	2	11,008	134.9	0	0	$1,055	1	0	0	1	$348	$0	$9,670	27.79	0.33
0253	DRUG ABUSE CTR	AHU-3	15	27	0	699	15.6	0	0	$93	0	2	0	3	$1,097	$0	$865	0.79	11.79
0253	DRUG ABUSE CTR	AHU-3	15	33	0	139	5.8	0	0	$29	0	1	0	0	$272	$0	$276	1.02	9.24
0253	DRUG ABUSE CTR	AHU-3	15	36	0	1,834	0.0	0	0	$76	0	0	0	2	$399	$0	$665	1.67	5.27
0253	DRUG ABUSE CTR	AHU-4	15	18	2	9,790	104.0	0	0	$878	1	0	0	1	$348	$0	$8,017	23.04	0.40
0253	DRUG ABUSE CTR	AHU-4	15	27	0	536	12.6	0	0	$74	0	2	0	3	$1,097	$0	$691	0.63	14.78
0253	DRUG ABUSE CTR	AHU-4	15	33	0	106	4.4	0	0	$23	0	1	0	0	$272	$0	$212	0.78	12.06
0253	DRUG ABUSE CTR	AHU-4	15	36	0	1,406	0.0	0	0	$58	0	0	0	2	$399	$0	$510	1.28	6.87
0253	DRUG ABUSE CTR	AHU-5	15	18	2	13,601	134.8	0	0	$1,180	1	0	0	1	$348	$0	$10,762	30.93	0.29
0253	DRUG ABUSE CTR	AHU-5	15	27	0	734	8.8	0	0	$66	0	2	0	3	$1,097	$0	$610	0.56	16.52
0253	DRUG ABUSE CTR	AHU-5	15	33	0	146	6.0	0	0	$31	0	1	0	0	$272	$0	$290	1.07	8.80
0253	DRUG ABUSE CTR	AHU-5	15	36	0	1,925	0.0	0	0	$80	0	0	0	2	$399	$0	$698	1.75	5.02
0253	DRUG ABUSE CTR	AHU-6	15	18	1	8,105	100.6	0	0	$784	1	0	0	1	$348	$0	$7,189	20.66	0.44
0253	DRUG ABUSE CTR	AHU-6	15	27	0	476	20.4	0	0	$104	0	2	0	3	$1,097	$0	$975	0.89	10.57

0253	DRUG ABUSE CTR	AHU-6	15	33	0	94	3.9	0	0	$20	0	1	0	0	$272	$0	$188	0.69	13.58
0253	DRUG ABUSE CTR	AHU-6	15	36	0	1,248	0.0	0	0	$52	0	0	0	2	$399	$0	$453	1.13	7.74
0253	DRUG ABUSE CTR	AHU-7	15	18	2	14,257	150.9	0	0	$1,273	1	0	0	1	$348	$0	$11,632	33.42	0.27
0253	DRUG ABUSE CTR	AHU-7	15	27	0	822	9.7	0	0	$74	0	2	0	3	$1,097	$0	$680	0.62	14.82
0253	DRUG ABUSE CTR	AHU-7	15	33	0	163	6.8	0	0	$35	0	1	0	0	$272	$0	$325	1.19	7.86
0253	DRUG ABUSE CTR	AHU-7	15	36	0	2,156	0.0	0	0	$89	0	0	0	2	$399	$0	$782	1.96	4.48
0253	DRUG ABUSE CTR	BLR-1	1	1	0	2,876	0.0	0	0	$119	2	0	0	0	$277	$0	$1,043	3.77	2.33
0253	DRUG ABUSE CTR	BLR-1	1	2	0	0	5.5	0	0	$22	0	0	0	3	$836	$0	$214	0.26	37.16
0253	DRUG ABUSE CTR	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0253	DRUG ABUSE CTR	CH-1	6	10	1	1,875	0.0	0	0	$91	1	0	1	0	$386	$0	$793	2.05	4.26
0253	DRUG ABUSE CTR	CH-1	6	11	0	560	0.0	0	0	$23	0	0	0	2	$664	$0	$203	0.31	28.71
0253	DRUG ABUSE CTR	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
0253	DRUG ABUSE CTR	CH-1	6	42	27	0	0.0	0	0	$686	1	0	0	0	$150	$0	$5,853	39.02	0.22
0253	DRUG ABUSE CTR	DTWP-1	24	22	2	8,128	0.0	3	0	$471	1	0	1	4	$1,418	$0	$4,098	2.89	3.01
0253	DRUG ABUSE CTR	DTWP-2	24	22	2	8,128	0.0	3	0	$471	1	0	1	4	$1,418	$0	$4,098	2.89	3.01
0301	FINANCE ADMIN	AHU-1	11	18	2	14,927	78.1	0	0	$1,001	1	0	0	1	$348	$0	$9,016	25.91	0.35
0301	FINANCE ADMIN	AHU-1	11	32	0	2,272	9.2	0	0	$132	0	3	0	11	$3,695	$0	$1,187	0.32	28.01
0301	FINANCE ADMIN	AHU-1	11	33	0	0	2.5	0	0	$10	0	1	0	0	$272	$0	$100	0.37	25.95
0301	FINANCE ADMIN	AHU-1	11	36	0	132	0.0	0	0	$5	0	0	0	2	$399	$0	$48	0.12	73.44
0301	FINANCE ADMIN	AHU-1	11	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0301	FINANCE ADMIN	AHU-2	11	18	11	72,285	393.7	0	0	$4,887	1	0	0	1	$348	$0	$44,059	126.61	0.07
0301	FINANCE ADMIN	AHU-2	11	32	0	11,926	43.2	0	0	$670	0	3	0	11	$3,695	$0	$6,019	1.63	5.51
0301	FINANCE ADMIN	AHU-2	11	33	0	0	13.4	0	0	$55	0	1	0	0	$272	$0	$524	1.93	4.94
0301	FINANCE ADMIN	AHU-2	11	36	0	691	0.0	0	0	$29	0	0	0	2	$399	$0	$250	0.63	13.99
0301	FINANCE ADMIN	AHU-2	11	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0301	FINANCE ADMIN	AHU-3	11	18	21	112,136	491.0	0	0	$7,191	1	0	0	1	$348	$0	$64,517	185.39	0.05
0301	FINANCE ADMIN	AHU-3	11	32	0	14,641	55.5	0	0	$833	0	3	0	11	$3,695	$0	$7,488	2.03	4.43
0301	FINANCE ADMIN	AHU-3	11	33	0	0	16.4	0	0	$68	0	1	0	0	$272	$0	$644	2.37	4.03
0301	FINANCE ADMIN	AHU-3	11	36	0	848	0.0	0	0	$35	0	0	0	2	$399	$0	$307	0.77	11.40
0301	FINANCE ADMIN	AHU-3	11	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0301	FINANCE ADMIN	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0301	FINANCE ADMIN	CH-1	8	17	21	438	0.0	3	0	$626	1	0	1	0	$243	$0	$5,345	22.00	0.39
0301	FINANCE ADMIN	CH-2	8	17	25	525	0.0	3	0	$737	1	0	1	0	$243	$0	$6,291	25.89	0.33
0301	FINANCE ADMIN	CH-3	8	17	8	175	0.0	3	0	$294	1	0	1	0	$243	$0	$2,507	10.32	0.83
0301	FINANCE ADMIN	CV-1	5	8	0	6,098	0.0	0	0	$252	1	0	1	0	$386	$0	$2,211	5.73	1.53
0301	FINANCE ADMIN	CV-1	5	9	0	0	5.2	0	0	$21	0	1	0	3	$1,109	$0	$205	0.18	51.62
0301	FINANCE ADMIN	RAD-1	25	23	0	6,098	0.0	3	0	$324	1	0	1	1	$570	$0	$2,825	4.96	1.76
0302	FINANCE ADMIN	ACCU-1	8	17	3	53	0.0	3	0	$138	1	0	1	0	$243	$0	$1,182	4.86	1.75
0302	FINANCE ADMIN	AHU-1	11	18	21	111,644	586.1	0	0	$7,563	1	0	0	1	$348	$0	$68,076	195.62	0.05
0302	FINANCE ADMIN	AHU-1	11	32	0	12,858	125.3	0	0	$1,047	0	3	0	11	$4,794	$0	$9,583	2.00	4.58
0302	FINANCE ADMIN	AHU-1	11	33	0	0	10.2	0	0	$42	0	1	0	0	$272	$0	$399	1.47	6.49

0302	FINANCE ADMIN	AHU-1	11	36	0	745	0.0	0	0	$31	0	0	0	2	$399	$0	$270	0.68	12.97
0302	FINANCE ADMIN	AHU-1	11	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0302	FINANCE ADMIN	AHU-2	15	18	0	2,517	0.0	0	0	$110	1	0	0	1	$348	$0	$963	2.77	3.17
0302	FINANCE ADMIN	AHU-2	15	27	0	491	0.0	0	0	$20	0	2	0	3	$1,097	$0	$178	0.16	54.15
0302	FINANCE ADMIN	BLR-1	1	1	0	9,874	0.0	0	0	$408	2	0	0	0	$277	$0	$3,580	12.93	0.68
0302	FINANCE ADMIN	BLR-1	1	2	0	0	4.3	0	0	$18	0	0	0	3	$836	$0	$167	0.20	47.72
0302	FINANCE ADMIN	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0302	FINANCE ADMIN	CH-1	8	17	21	438	0.0	3	0	$626	1	0	1	0	$243	$0	$5,345	22.00	0.39
0302	FINANCE ADMIN	UH-1-4	21	20	0	1,237	68.8	0	0	$335	1	0	1	2	$1,213	$0	$3,151	2.60	3.62
0313	CIV PERS BLDG	AHU-1	15	18	3	15,361	21.2	0	0	$801	1	0	0	1	$348	$0	$7,079	20.34	0.43
0313	CIV PERS BLDG	AHU-1	15	27	0	1,172	63.1	0	0	$308	0	2	0	3	$1,097	$0	$2,902	2.65	3.56
0313	CIV PERS BLDG	CH-1	8	17	11	236	0.0	3	0	$371	1	0	1	0	$243	$0	$3,169	13.04	0.65
0319	GEN INSTR BLDG	AHU-1	15	18	11	56,740	433.5	0	0	$4,409	1	0	0	1	$348	$0	$39,984	114.90	0.08
0319	GEN INSTR BLDG	AHU-1	15	27	0	3,127	43.0	0	0	$306	0	2	0	3	$1,097	$0	$2,820	2.57	3.58
0319	GEN INSTR BLDG	AHU-1	15	33	0	0	18.7	0	0	$77	0	1	0	0	$272	$0	$733	2.69	3.54
0319	GEN INSTR BLDG	AHU-1	15	36	0	2,667	0.0	0	0	$110	0	0	0	2	$399	$0	$967	2.42	3.62
0319	GEN INSTR BLDG	BLR-1	1	1	0	6,490	0.0	0	0	$268	2	0	0	0	$277	$0	$2,353	8.50	1.03
0319	GEN INSTR BLDG	BLR-1	1	2	0	0	3.8	0	0	$16	0	0	0	3	$836	$0	$150	0.18	53.02
0319	GEN INSTR BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0319	GEN INSTR BLDG	CH-1	8	17	21	438	0.0	3	0	$626	1	0	1	0	$243	$0	$5,345	22.00	0.39
0319	GEN INSTR BLDG	RAD-1	25	23	0	7,130	0.0	3	0	$366	1	0	1	1	$570	$0	$3,199	5.61	1.56
0330	DEH ADMIN	AHU-1	15	18	2	17,892	92.1	0	0	$1,181	1	0	0	1	$348	$0	$10,640	30.58	0.29
0330	DEH ADMIN	AHU-1	15	27	0	2,411	30.3	0	0	$224	0	2	0	3	$1,097	$0	$2,064	1.88	4.89
0330	DEH ADMIN	AHU-2	15	18	2	19,845	101.3	0	0	$1,300	1	0	0	1	$348	$0	$11,710	33.65	0.27
0330	DEH ADMIN	AHU-2	15	27	0	2,893	33.3	0	0	$257	0	2	0	3	$1,097	$0	$2,358	2.15	4.27
0330	DEH ADMIN	AHU-3	15	18	2	19,650	78.3	0	0	$1,197	1	0	0	1	$348	$0	$10,735	30.85	0.29
0330	DEH ADMIN	AHU-3	15	27	0	2,845	25.8	0	0	$224	0	2	0	3	$1,097	$0	$2,043	1.86	4.91
0330	DEH ADMIN	AHU-4	15	18	2	19,650	78.3	0	0	$1,197	1	0	0	1	$348	$0	$10,735	30.85	0.29
0330	DEH ADMIN	AHU-4	15	27	0	2,845	25.8	0	0	$224	0	2	0	3	$1,097	$0	$2,043	1.86	4.91
0330	DEH ADMIN	AHU-5	15	18	0	4,960	13.8	0	0	$274	1	0	0	1	$348	$0	$2,443	7.02	1.27
0330	DEH ADMIN	AHU-5	15	27	0	844	4.5	0	0	$54	0	2	0	3	$1,097	$0	$484	0.44	20.48
0330	DEH ADMIN	AHU-6	15	18	2	19,845	101.3	0	0	$1,300	1	0	0	1	$348	$0	$11,710	33.65	0.27
0330	DEH ADMIN	AHU-6	15	27	0	2,893	33.3	0	0	$257	0	2	0	3	$1,097	$0	$2,358	2.15	4.27
0330	DEH ADMIN	CH-1	8	17	2	35	0.0	3	0	$116	1	0	1	0	$243	$0	$993	4.08	2.09
0330	DEH ADMIN	CH-2	8	17	2	35	0.0	3	0	$116	1	0	1	0	$243	$0	$993	4.08	2.09
0330	DEH ADMIN	CH-3	8	17	2	35	0.0	3	0	$116	1	0	1	0	$243	$0	$993	4.08	2.09
0330	DEH ADMIN	CH-4	8	17	3	53	0.0	3	0	$138	1	0	1	0	$243	$0	$1,182	4.86	1.75
0330	DEH ADMIN	CH-5	8	17	2	35	0.0	3	0	$116	1	0	1	0	$243	$0	$993	4.08	2.09
0330	DEH ADMIN	CH-6	8	17	2	35	0.0	3	0	$116	1	0	1	0	$243	$0	$993	4.08	2.09
0364	UEMCS HQ	AHU-1	15	18	0	5,253	88.6	0	0	$582	1	0	0	1	$348	$0	$5,382	15.46	0.60
0364	UEMCS HQ	AHU-1	15	27	0	916	29.1	0	0	$158	0	2	0	3	$1,097	$0	$1,476	1.35	6.95

0364	UEMCS HQ	CH-1	8	17	3	53	0.0	3	0	$138	1	0	1	0	$243	$0	$1,182	4.86	1.75
0402	ENL BARRACKS W/AS	AHU-1	10	18	11	0	43.1	0	0	$457	1	0	0	1	$348	$0	$4,079	11.72	0.76
0402	ENL BARRACKS W/AS	AHU-1	10	29	0	7,311	85.7	0	0	$655	0	7	0	8	$3,378	$0	$6,015	1.78	5.16
0402	ENL BARRACKS W/AS	AHU-1	10	35	0	8,250	0.0	0	0	$341	0	0	0	2	$399	$0	$2,992	7.50	1.17
0402	ENL BARRACKS W/AS	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0402	ENL BARRACKS W/AS	AHU-2	10	18	7	0	53.8	0	0	$412	1	0	0	1	$348	$0	$3,735	10.73	0.84
0402	ENL BARRACKS W/AS	AHU-2	10	29	0	9,251	107.1	0	0	$823	0	7	0	8	$3,378	$0	$7,560	2.24	4.10
0402	ENL BARRACKS W/AS	AHU-2	10	35	0	10,440	0.0	0	0	$431	0	0	0	2	$399	$0	$3,786	9.49	0.93
0402	ENL BARRACKS W/AS	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0402	ENL BARRACKS W/AS	AHU-3	10	18	5	0	10.8	0	0	$162	1	0	0	1	$348	$0	$1,428	4.10	2.15
0402	ENL BARRACKS W/AS	AHU-3	10	29	0	1,019	21.4	0	0	$130	0	7	0	8	$3,378	$0	$1,211	0.36	25.92
0402	ENL BARRACKS W/AS	AHU-3	10	35	0	1,150	0.0	0	0	$48	0	0	0	2	$399	$0	$417	1.05	8.40
0402	ENL BARRACKS W/AS	AHU-3	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0402	ENL BARRACKS W/AS	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0402	ENL BARRACKS W/AS	CH-1	6	10	1	0	0.0	0	0	$24	1	0	1	0	$386	$0	$201	0.52	16.37
0402	ENL BARRACKS W/AS	CH-1	6	11	0	1,138	0.0	0	0	$47	0	0	0	2	$664	$0	$412	0.62	14.13
0402	ENL BARRACKS W/AS	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
0402	ENL BARRACKS W/AS	CH-1	6	42	55	0	0.0	0	0	$1,394	1	0	0	0	$150	$0	$11,888	79.25	0.11
0403	ADMIN GEN PURP	AHU-1	22	20	0	54,881	332.2	0	0	$3,635	1	0	1	2	$1,213	$0	$32,945	27.16	0.33
0403	ADMIN GEN PURP	AHU-2	22	20	0	72,140	332.2	0	0	$4,348	1	0	1	2	$1,213	$0	$39,203	32.32	0.28
0403	ADMIN GEN PURP	HWP-1	26	24	0	16,728	0.0	3	0	$763	1	0	1	0	$386	$0	$6,680	17.31	0.51
0403	ADMIN GEN PURP	HWP-2	26	24	0	14,924	0.0	3	0	$688	1	0	1	0	$386	$0	$6,026	15.61	0.56
0403	ADMIN GEN PURP	HWP-3	26	24	0	32,517	0.0	3	0	$1,415	1	0	1	0	$386	$0	$12,405	32.14	0.27
0403	ADMIN GEN PURP	HWP-4	26	24	0	28,386	0.0	3	0	$1,244	1	0	1	0	$386	$0	$10,907	28.26	0.31
0404	ENL BARRACKS W/DAS	AHU-1	15	18	21	0	46.3	0	0	$727	1	0	0	1	$348	$0	$6,396	18.38	0.48
0404	ENL BARRACKS W/DAS	AHU-1	15	27	0	6,719	92.1	0	0	$657	0	2	0	3	$1,097	$0	$6,053	5.52	1.67
0404	ENL BARRACKS W/DAS	AHU-1	15	36	0	7,582	0.0	0	0	$313	0	0	0	2	$399	$0	$2,749	6.89	1.27
0404	ENL BARRACKS W/DAS	AHU-2	15	18	21	0	37.7	0	0	$692	1	0	0	1	$348	$0	$6,058	17.41	0.50
0404	ENL BARRACKS W/DAS	AHU-2	15	27	0	5,543	75.0	0	0	$538	0	2	0	3	$1,097	$0	$4,954	4.52	2.04
0404	ENL BARRACKS W/DAS	AHU-2	15	36	0	6,255	0.0	0	0	$258	0	0	0	2	$399	$0	$2,268	5.68	1.54
0404	ENL BARRACKS W/DAS	AHU-3	15	18	5	0	10.8	0	0	$162	1	0	0	1	$348	$0	$1,428	4.10	2.15
0404	ENL BARRACKS W/DAS	AHU-3	15	27	0	1,568	21.4	0	0	$153	0	2	0	3	$1,097	$0	$1,410	1.29	7.17
0404	ENL BARRACKS W/DAS	AHU-3	15	36	0	1,770	0.0	0	0	$73	0	0	0	2	$399	$0	$642	1.61	5.46
0404	ENL BARRACKS W/DAS	AHU-4	15	18	5	0	12.9	0	0	$171	1	0	0	1	$348	$0	$1,512	4.35	2.03
0404	ENL BARRACKS W/DAS	AHU-4	15	27	0	1,850	25.7	0	0	$182	0	2	0	3	$1,097	$0	$1,680	1.53	6.02
0404	ENL BARRACKS W/DAS	AHU-4	15	36	0	2,088	0.0	0	0	$86	0	0	0	2	$399	$0	$757	1.90	4.63
0404	ENL BARRACKS W/DAS	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0404	ENL BARRACKS W/DAS	CH-1	6	10	2	0	0.0	0	0	$44	1	0	1	0	$386	$0	$377	0.98	8.74
0404	ENL BARRACKS W/DAS	CH-1	6	11	0	788	0.0	0	0	$33	0	0	0	2	$664	$0	$286	0.43	20.42
0404	ENL BARRACKS W/DAS	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
0404	ENL BARRACKS W/DAS	CH-1	6	42	38	0	0.0	0	0	$965	1	0	0	0	$150	$0	$8,230	54.87	0.16

[illegible] NO.	[illegible]	[illegible]	[illegible] LIFE	[illegible]	[illegible] PER YR	[illegible] SVGS. PER YR	[illegible] SVGS. PER YR	LABOR HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	[illegible] PNT	[illegible] PNT	[illegible] PNT	[illegible] PNT	TOTAL CONSTR. COST	[illegible] PER YR	TOTAL DISC. SAVINGS	[illegible]	[illegible]
0404	ENL BARRACKS W/DAS	CH-2	6	10	1	0	0.0	0	0	$17	1	0	1	0	$386	$0	$143	0.37	22.96
0404	ENL BARRACKS W/DAS	CH-2	6	11	0	350	0.0	0	0	$14	0	0	0	2	$664	$0	$127	0.19	45.94
0404	ENL BARRACKS W/DAS	CH-2	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
0404	ENL BARRACKS W/DAS	CH-2	6	42	17	0	0.0	0	0	$429	1	0	0	0	$150	$0	$3,658	24.39	0.35
0404	ENL BARRACKS W/DAS	RAD-1	27	25	0	0	0.0	3	0	$72	0	1	0	1	$456	$0	$614	1.35	6.33
0405	ADMIN GEN PURP	AHU-1	15	18	3	24,871	940.7	0	0	$4,982	1	0	0	1	$348	$0	$46,631	134.00	0.07
0405	ADMIN GEN PURP	AHU-1	15	27	0	4,286	84.4	0	0	$525	0	2	0	3	$1,097	$0	$4,867	4.44	2.09
0405	ADMIN GEN PURP	AHU-1	15	36	0	248	0.0	0	0	$10	0	0	0	2	$399	$0	$90	0.23	38.92
0405	ADMIN GEN PURP	BLR-1	1	2	0	0	5.4	0	0	$22	0	0	0	3	$836	$0	$214	0.26	37.28
0405	ADMIN GEN PURP	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0405	ADMIN GEN PURP	CH-1	6	11	0	1,015	0.0	0	0	$42	0	0	0	2	$664	$0	$368	0.55	15.84
0405	ADMIN GEN PURP	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
0405	ADMIN GEN PURP	CH-1	6	42	49	0	0.0	0	0	$1,244	1	0	0	0	$150	$0	$10,608	70.72	0.12
0405	ADMIN GEN PURP	DTWP-1	24	22	6	19,764	0.0	3	0	$1,047	1	0	1	4	$1,418	$0	$9,138	6.44	1.35
0405	ADMIN GEN PURP	FC-1	19	20	0	13,947	75.0	0	0	$885	1	0	1	2	$1,213	$0	$8,001	6.60	1.37
0405	ADMIN GEN PURP	FC-2	19	20	0	15,071	63.1	0	0	$883	1	0	1	2	$1,213	$0	$7,944	6.55	1.37
0406	CID BLDG	AHU-1	33	18	11	57,753	548.8	0	0	$4,926	1	0	0	1	$348	$0	$44,879	128.96	0.07
0406	CID BLDG	AHU-1	33	33	0	0	5.2	0	0	$21	0	1	0	0	$272	$0	$204	0.75	12.70
0406	CID BLDG	AHU-1	33	35	0	380	0.0	0	0	$16	0	0	0	2	$399	$0	$138	0.35	25.40
0406	CID BLDG	AHU-1	33	38	0	6,569	146.1	0	0	$873	0	8	0	9	$3,947	$0	$8,117	2.06	4.52
0406	CID BLDG	AHU-1	33	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0406	CID BLDG	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0406	CID BLDG	CH-1	8	17	17	350	0.0	3	0	$515	1	0	1	0	$243	$0	$4,399	18.10	0.47
0409	ENL BARRACKS W/AS	AHU-1	10	18	2	0	10.9	0	0	$90	1	0	0	1	$348	$0	$811	2.33	3.88
0409	ENL BARRACKS W/AS	AHU-1	10	29	0	1,529	21.7	0	0	$153	0	7	0	8	$3,378	$0	$1,406	0.42	22.15
0409	ENL BARRACKS W/AS	AHU-1	10	35	0	1,725	0.0	0	0	$71	0	0	0	2	$399	$0	$626	1.57	5.60
0409	ENL BARRACKS W/AS	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0409	ENL BARRACKS W/AS	AHU-2	10	18	3	0	7.9	0	0	$112	1	0	0	1	$348	$0	$990	2.84	3.10
0409	ENL BARRACKS W/AS	AHU-2	10	29	0	2,795	15.8	0	0	$180	0	7	0	8	$3,378	$0	$1,633	0.48	18.72
0409	ENL BARRACKS W/AS	AHU-2	10	35	0	3,154	0.0	0	0	$130	0	0	0	2	$399	$0	$1,144	2.87	3.06
0409	ENL BARRACKS W/AS	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0409	ENL BARRACKS W/AS	AHU-3	10	18	5	0	15.9	0	0	$183	1	0	0	1	$348	$0	$1,628	4.68	1.90
0409	ENL BARRACKS W/AS	AHU-3	10	29	0	4,794	31.6	0	0	$328	0	7	0	8	$3,378	$0	$2,977	0.88	10.30
0409	ENL BARRACKS W/AS	AHU-3	10	35	0	5,410	0.0	0	0	$223	0	0	0	2	$399	$0	$1,962	4.92	1.79
0409	ENL BARRACKS W/AS	AHU-3	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0409	ENL BARRACKS W/AS	AHU-4	10	18	11	0	23.8	0	0	$378	1	0	0	1	$348	$0	$3,322	9.55	0.92
0409	ENL BARRACKS W/AS	AHU-4	10	29	0	11,819	47.3	0	0	$683	0	7	0	8	$3,378	$0	$6,144	1.82	4.94
0409	ENL BARRACKS W/AS	AHU-4	10	35	0	13,338	0.0	0	0	$551	0	0	0	2	$399	$0	$4,836	12.12	0.72
0409	ENL BARRACKS W/AS	AHU-4	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0409	ENL BARRACKS W/AS	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0409	ENL BARRACKS W/AS	CH-1	6	10	2	0	0.0	0	0	$44	1	0	1	0	$386	$0	$377	0.98	8.74

[illegible]	[illegible]	[illegible]	TYPE	[illegible]	KW SVGS PER YR	[illegible] SVGS PER YR	[illegible] SVGS PER YR	[illegible] HOUR SVGS PER YR	MATRL $VGS PER YR	COST SVGS PER YR	[illegible] PNT	[illegible] PNT	[illegible] PNT	[illegible] PNT	[illegible]	[illegible] PER YR	[illegible]	[illegible]	[illegible]
0409	ENL BARRACKS W/AS	CH-1	6	11	0	1,292	0.0	0	0	$53	0	0	0	2	$664	$0	$468	0.71	12.45
0409	ENL BARRACKS W/AS	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
0409	ENL BARRACKS W/AS	CH-1	6	42	62	0	0.0	0	0	$1,582	1	0	0	0	$150	$0	$13,498	89.98	0.09
0409	ENL BARRACKS W/AS	RAD-1	27	25	0	0	0.0	3	0	$72	0	1	0	1	$456	$0	$614	1.35	6.33
0409	ENL BARRACKS W/AS	UH-1	21	20	0	0	7.9	0	0	$33	1	0	1	2	$1,213	$0	$311	0.26	37.13
0409	ENL BARRACKS W/AS	UH-2	21	20	0	0	7.9	0	0	$33	1	0	1	2	$1,213	$0	$311	0.26	37.13
0410	ENL BARRACKS W/AS	AHU-1	10	18	2	0	5.9	0	0	$69	1	0	0	1	$348	$0	$616	1.77	5.02
0410	ENL BARRACKS W/AS	AHU-1	10	29	0	1,529	11.8	0	0	$112	0	7	0	8	$3,378	$0	$1,019	0.30	30.19
0410	ENL BARRACKS W/AS	AHU-1	10	35	0	1,725	0.0	0	0	$71	0	0	0	2	$399	$0	$626	1.57	5.60
0410	ENL BARRACKS W/AS	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0410	ENL BARRACKS W/AS	AHU-2	10	18	11	0	28.7	0	0	$398	1	0	0	1	$348	$0	$3,517	10.11	0.87
0410	ENL BARRACKS W/AS	AHU-2	10	29	0	9,702	57.2	0	0	$636	0	7	0	8	$3,378	$0	$5,764	1.71	5.31
0410	ENL BARRACKS W/AS	AHU-2	10	35	0	10,949	0.0	0	0	$452	0	0	0	2	$399	$0	$3,970	9.95	0.88
0410	ENL BARRACKS W/AS	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0410	ENL BARRACKS W/AS	AHU-3	10	18	11	0	28.7	0	0	$398	1	0	0	1	$348	$0	$3,517	10.11	0.87
0410	ENL BARRACKS W/AS	AHU-3	10	29	0	9,702	57.2	0	0	$636	0	7	0	8	$3,378	$0	$5,764	1.71	5.31
0410	ENL BARRACKS W/AS	AHU-3	10	35	0	10,949	0.0	0	0	$452	0	0	0	2	$399	$0	$3,970	9.95	0.88
0410	ENL BARRACKS W/AS	AHU-3	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0410	ENL BARRACKS W/AS	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0410	ENL BARRACKS W/AS	CH-1	6	10	2	0	0.0	0	0	$44	1	0	1	0	$386	$0	$377	0.98	8.74
0410	ENL BARRACKS W/AS	CH-1	6	11	0	1,292	0.0	0	0	$53	0	0	0	2	$664	$0	$468	0.71	12.45
0410	ENL BARRACKS W/AS	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
0410	ENL BARRACKS W/AS	CH-1	6	42	62	0	0.0	0	0	$1,582	1	0	0	0	$150	$0	$13,498	89.98	0.09
0410	ENL BARRACKS W/AS	RAD-1	27	25	0	0	0.0	3	0	$72	0	1	0	1	$456	$0	$614	1.35	6.33
0410	ENL BARRACKS W/AS	UH-1	21	20	0	0	7.9	0	0	$33	1	0	1	2	$1,213	$0	$311	0.26	37.13
0410	ENL BARRACKS W/AS	UH-2	21	20	0	0	7.9	0	0	$33	1	0	1	2	$1,213	$0	$311	0.26	37.13
0411	ENL BARRACKS W/AS	AHU-1	10	18	2	0	10.9	0	0	$90	1	0	0	1	$348	$0	$811	2.33	3.88
0411	ENL BARRACKS W/AS	AHU-1	10	29	0	1,529	21.7	0	0	$153	0	7	0	8	$3,378	$0	$1,406	0.42	22.15
0411	ENL BARRACKS W/AS	AHU-1	10	35	0	1,725	0.0	0	0	$71	0	0	0	2	$399	$0	$626	1.57	5.60
0411	ENL BARRACKS W/AS	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0411	ENL BARRACKS W/AS	AHU-2	10	18	3	0	7.9	0	0	$112	1	0	0	1	$348	$0	$990	2.84	3.10
0411	ENL BARRACKS W/AS	AHU-2	10	29	0	2,795	15.8	0	0	$180	0	7	0	8	$3,378	$0	$1,633	0.48	18.72
0411	ENL BARRACKS W/AS	AHU-2	10	35	0	3,154	0.0	0	0	$130	0	0	0	2	$399	$0	$1,144	2.87	3.06
0411	ENL BARRACKS W/AS	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0411	ENL BARRACKS W/AS	AHU-3	10	18	5	0	15.9	0	0	$183	1	0	0	1	$348	$0	$1,628	4.68	1.90
0411	ENL BARRACKS W/AS	AHU-3	10	29	0	4,794	31.6	0	0	$328	0	7	0	8	$3,378	$0	$2,977	0.88	10.30
0411	ENL BARRACKS W/AS	AHU-3	10	35	0	5,410	0.0	0	0	$223	0	0	0	2	$399	$0	$1,962	4.92	1.79
0411	ENL BARRACKS W/AS	AHU-3	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0411	ENL BARRACKS W/AS	AHU-4	10	18	11	0	23.8	0	0	$378	1	0	0	1	$348	$0	$3,322	9.55	0.92
0411	ENL BARRACKS W/AS	AHU-4	10	29	0	11,819	47.3	0	0	$683	0	7	0	8	$3,378	$0	$6,144	1.82	4.94
0411	ENL BARRACKS W/AS	AHU-4	10	35	0	13,338	0.0	0	0	$551	0	0	0	2	$399	$0	$4,836	12.12	0.72

0411	ENL BARRACKS W/AS	AHU-4	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0411	ENL BARRACKS W/AS	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0411	ENL BARRACKS W/AS	CH-1	6	10	2	0	0.0	0	0	$44	1	0	1	0	$386	$0	$377	0.98	8.74
0411	ENL BARRACKS W/AS	CH-1	6	11	0	1,292	0.0	0	0	$53	0	0	0	2	$664	$0	$468	0.71	12.45
0411	ENL BARRACKS W/AS	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
0411	ENL BARRACKS W/AS	CH-1	6	42	62	0	0.0	0	0	$1,582	1	0	0	0	$150	$0	$13,498	89.98	0.09
0411	ENL BARRACKS W/AS	UH-1	21	20	0	0	7.9	0	0	$33	1	0	1	2	$1,213	$0	$311	0.26	37.13
0411	ENL BARRACKS W/AS	UH-2	21	20	0	0	7.9	0	0	$33	1	0	1	2	$1,213	$0	$311	0.26	37.13
0500	POST HQ BLDG	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0500	POST HQ BLDG	CT-1	26	24	0	1,115	0.0	3	0	$118	1	0	1	0	$386	$0	$1,019	2.64	3.27
0500	POST HQ BLDG	CT-2	26	24	0	1,115	0.0	3	0	$118	1	0	1	0	$386	$0	$1,019	2.64	3.27
0500	POST HQ BLDG	HP-1	22	20	0	33,892	383.4	0	0	$2,979	1	0	1	2	$1,213	$0	$27,343	22.54	0.41
0500	POST HQ BLDG	HP-2	22	20	0	38,913	407.3	0	0	$3,285	1	0	1	2	$1,213	$0	$30,104	24.82	0.37
0500	POST HQ BLDG	HP-3	22	20	0	46,261	359.4	0	0	$3,391	1	0	1	2	$1,213	$0	$30,887	25.46	0.36
0500	POST HQ BLDG	HP-4	22	20	0	75,175	431.3	0	0	$4,882	1	0	1	2	$1,213	$0	$44,194	36.43	0.25
0500	POST HQ BLDG	HP-5	22	20	0	81,620	479.2	0	0	$5,345	1	0	1	2	$1,213	$0	$48,413	39.91	0.23
0500	POST HQ BLDG	HP-6	22	20	0	51,170	335.5	0	0	$3,495	1	0	1	2	$1,213	$0	$31,726	26.16	0.35
0509	ADMIN GEN PURPOSE	HP-1	22	20	0	39,438	370.1	0	0	$3,153	1	0	1	2	$1,213	$0	$28,831	23.77	0.38
0512	SR ENL QTRS	AHU-1	15	18	5	0	3.3	0	0	$131	1	0	0	1	$348	$0	$1,134	3.26	2.65
0512	SR ENL QTRS	AHU-1	15	27	0	980	6.5	0	0	$67	0	2	0	3	$1,097	$0	$612	0.56	16.28
0512	SR ENL QTRS	AHU-1	15	36	0	1,106	0.0	0	0	$46	0	0	0	2	$399	$0	$401	1.01	8.74
0512	SR ENL QTRS	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0512	SR ENL QTRS	CH-1	8	17	8	175	0.0	3	0	$294	1	0	1	0	$243	$0	$2,507	10.32	0.83
0512	SR ENL QTRS	CH-2	6	10	1	0	0.0	0	0	$30	1	0	1	0	$386	$0	$254	0.66	12.94
0512	SR ENL QTRS	CH-2	6	11	0	525	0.0	0	0	$22	0	0	0	2	$664	$0	$190	0.29	30.62
0512	SR ENL QTRS	CH-2	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
0512	SR ENL QTRS	CH-2	6	42	25	0	0.0	0	0	$643	1	0	0	0	$150	$0	$5,487	36.58	0.23
0512	SR ENL QTRS	CV-1	5	9	0	0	7.3	0	0	$30	0	1	0	3	$1,109	$0	$287	0.26	36.83
0540	OFF QTRS MILIT	BLR-1	1	2	0	0	5.6	0	0	$23	0	0	0	3	$836	$0	$219	0.26	36.37
0540	OFF QTRS MILIT	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0540	OFF QTRS MILIT	BLR-2	1	2	0	0	1.9	0	0	$8	0	0	0	3	$836	$0	$73	0.09	109.11
0540	OFF QTRS MILIT	BLR-2	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0540	OFF QTRS MILIT	CH-1	8	17	34	700	0.0	3	0	$959	1	0	1	0	$243	$0	$8,184	33.68	0.25
0540	OFF QTRS MILIT	DTWP-1	24	22	3	0	0.0	3	0	$159	1	0	1	4	$1,418	$0	$1,360	0.96	8.90
0540	OFF QTRS MILIT	DTWP-2	24	22	3	0	0.0	3	0	$152	1	0	1	4	$1,418	$0	$1,293	0.91	9.36
0541	OFF QTRS MILIT	BLR-1	1	2	0	0	5.6	0	0	$23	0	0	0	3	$836	$0	$219	0.26	36.37
0541	OFF QTRS MILIT	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0541	OFF QTRS MILIT	BLR-2	1	2	0	0	1.9	0	0	$8	0	0	0	3	$836	$0	$73	0.09	109.11
0541	OFF QTRS MILIT	BLR-2	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0541	OFF QTRS MILIT	CH-1	6	11	0	700	0.0	0	0	$29	0	0	0	2	$664	$0	$254	0.38	22.97
0541	OFF QTRS MILIT	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93

[illegible]	BLDG NA[illegible]	[illegible]	TYPE	FUNCTION NUMBER	KW SVGS PER YR	KWH SVGS PER YR	[illegible] SVGS PER YR	LABOR HOUR SVGS PER YR	MATRL SVGS PER YR	COST SVGS PER YR	DO PNT	AO PNT	DI PNT	AI PNT	[illegible]	[illegible] COST PER YR	[illegible]	[illegible]
0541	OFF QTRS MILIT	CH-1	6	42	34	0	0.0	0	0	$858	1	0	0	0	$150	$0	$7,316	48.77	0.17
0541	OFF QTRS MILIT	DTWP-1	24	22	3	0	0.0	3	0	$159	1	0	1	4	$1,418	$0	$1,360	0.96	8.90
0541	OFF QTRS MILIT	DTWP-2	24	22	3	0	0.0	3	0	$152	1	0	1	4	$1,418	$0	$1,293	0.91	9.36
0542	OFF QTRS MILIT	BLR-1	1	2	0	0	5.6	0	0	$23	0	0	0	3	$836	$0	$219	0.26	36.37
0542	OFF QTRS MILIT	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0542	OFF QTRS MILIT	BLR-2	1	2	0	0	1.9	0	0	$8	0	0	0	3	$836	$0	$73	0.09	109.11
0542	OFF QTRS MILIT	BLR-2	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0542	OFF QTRS MILIT	CH-1	8	17	34	700	0.0	3	0	$959	1	0	1	0	$243	$0	$8,184	33.68	0.25
0542	OFF QTRS MILIT	DTWP-1	24	22	3	0	0.0	3	0	$159	1	0	1	4	$1,418	$0	$1,360	0.96	8.90
0542	OFF QTRS MILIT	DTWP-2	24	22	3	0	0.0	3	0	$152	1	0	1	4	$1,418	$0	$1,293	0.91	9.36
0602	DENTAL CLINIC	AHU-1	18	19	0	140,970	496.2	0	0	$7,867	2	0	0	2	$697	$0	$70,602	101.29	0.09
0602	DENTAL CLINIC	AHU-1	18	28	0	3,450	34.2	0	0	$283	1	7	0	9	$3,761	$0	$2,593	0.69	13.28
0602	DENTAL CLINIC	AHU-1	18	34	0	513	21.3	0	0	$109	0	1	0	0	$272	$0	$1,022	3.76	2.50
0602	DENTAL CLINIC	AHU-1	18	37	0	9,045	0.0	0	0	$374	0	0	0	2	$399	$0	$3,280	8.22	1.07
0602	DENTAL CLINIC	AHU-1	18	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0602	DENTAL CLINIC	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0602	DENTAL CLINIC	CH-1	7	10	1	4,384	0.0	0	0	$211	1	0	1	0	$386	$0	$1,844	4.78	1.83
0602	DENTAL CLINIC	CH-1	7	12	0	1,369	0.0	0	0	$57	0	0	0	4	$1,133	$0	$496	0.44	20.05
0602	DENTAL CLINIC	CH-1	7	16	0	0	0.0	6	0	$144	0	0	2	0	$281	$0	$1,228	4.37	1.95
0602	DENTAL CLINIC	CH-1	7	43	66	0	0.0	0	0	$1,677	5	0	0	0	$530	$0	$14,302	26.99	0.32
0602	DENTAL CLINIC	CV-1	5	8	0	1,010	0.0	0	0	$42	1	0	1	0	$386	$0	$366	0.95	9.25
0602	DENTAL CLINIC	CV-1	5	9	0	0	2.8	0	0	$12	0	1	0	3	$1,109	$0	$111	0.10	94.95
0602	DENTAL CLINIC	RAD-1	25	23	0	1,010	0.0	3	0	$114	1	0	1	1	$570	$0	$980	1.72	5.01
0610	ENL BARRACKS W/AS	CH-1	7	10	3	0	0.0	0	0	$71	1	0	1	0	$386	$0	$608	1.58	5.42
0610	ENL BARRACKS W/AS	CH-1	7	12	0	2,030	0.0	0	0	$84	0	0	0	4	$1,133	$0	$736	0.65	13.51
0610	ENL BARRACKS W/AS	CH-1	7	16	0	0	0.0	6	0	$144	0	0	2	0	$281	$0	$1,228	4.37	1.95
0610	ENL BARRACKS W/AS	CH-1	7	43	98	0	0.0	0	0	$2,487	5	0	0	0	$530	$0	$21,216	40.03	0.21
0610	ENL BARRACKS W/AS	CV-1	5	9	0	0	3.6	0	0	$15	0	1	0	3	$1,109	$0	$140	0.13	75.35
0610	ENL BARRACKS W/AS	DTWP-1	24	22	16	0	0.0	3	0	$486	1	0	1	4	$1,418	$0	$4,147	2.92	2.92
0610	ENL BARRACKS W/AS	DTWP-2	24	22	14	0	0.0	3	0	$434	1	0	1	4	$1,418	$0	$3,698	2.61	3.27
0620	OFF QTRS MILIT	CV-1	5	9	0	0	2.3	0	0	$9	0	1	0	3	$1,109	$0	$89	0.08	119.04
0621	OFF QTRS TRANS	CV-1	5	8	0	4,800	0.0	0	0	$198	1	0	1	0	$386	$0	$1,741	4.51	1.95
0621	OFF QTRS TRANS	CV-1	5	9	0	0	2.3	0	0	$9	0	1	0	3	$1,109	$0	$89	0.08	119.04
0650	COLD STOR FAC	CH-1 - 4	30	45	0	0	0.0	34	0	$816	0	0	0	13	$2,452	$0	$6,960	2.84	3.00
0652	COLD STOR FAC	CH-1 - 4	31	46	0	0	0.0	18	0	$432	0	0	0	5	$979	$0	$3,685	3.76	2.27
0710	TAC EQUIP SHOP	ACCU-1	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
0710	TAC EQUIP SHOP	AHU-1	15	18	1	3,675	3.0	0	0	$188	1	0	0	1	$348	$0	$1,652	4.75	1.85
0710	TAC EQUIP SHOP	AHU-1	15	27	0	347	9.0	0	0	$52	0	2	0	3	$1,097	$0	$480	0.44	21.29
0710	TAC EQUIP SHOP	BLR-1	1	1	0	5,755	0.0	0	0	$238	2	0	0	0	$277	$0	$2,087	7.53	1.17
0710	TAC EQUIP SHOP	BLR-1	1	2	0	0	2.3	0	0	$9	0	0	0	3	$836	$0	$89	0.11	89.47
0710	TAC EQUIP SHOP	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44

0710	TAC EQUIP SHOP	MAU-1	16	18	0	1,700	0.0	0	0	$70	1	0	0	1	$348	$0	$617	1.77	4.96
0710	TAC EQUIP SHOP	MAU-1	16	30	0	0	18.0	0	0	$74	0	1	0	3	$813	$0	$707	0.87	10.96
0710	TAC EQUIP SHOP	UH-1	21	20	0	3,244	85.5	0	0	$486	1	0	1	2	$1,213	$0	$4,532	3.74	2.50
0720	AF OPS BLDG	AHU-1	15	18	1	6,782	47.5	0	0	$499	1	0	0	1	$348	$0	$4,525	13.00	0.70
0720	AF OPS BLDG	AHU-1	15	27	0	504	21.6	0	0	$110	0	2	0	3	$1,097	$0	$1,029	0.94	10.01
0720	AF OPS BLDG	AHU-1	15	36	0	1,160	0.0	0	0	$48	0	0	0	2	$399	$0	$421	1.05	8.33
0720	AF OPS BLDG	AHU-2	15	18	1	7,125	65.4	0	0	$587	1	0	0	1	$348	$0	$5,353	15.38	0.59
0720	AF OPS BLDG	AHU-2	15	27	0	504	21.6	0	0	$110	0	2	0	3	$1,097	$0	$1,029	0.94	10.01
0720	AF OPS BLDG	AHU-2	15	33	0	18	1.0	0	0	$5	0	1	0	0	$272	$0	$45	0.16	57.41
0720	AF OPS BLDG	AHU-2	15	36	0	1,160	0.0	0	0	$48	0	0	0	2	$399	$0	$421	1.05	8.33
0720	AF OPS BLDG	AHU-3	15	18	1	7,125	65.4	0	0	$587	1	0	0	1	$348	$0	$5,353	15.38	0.59
0720	AF OPS BLDG	AHU-3	15	27	0	504	21.6	0	0	$110	0	2	0	3	$1,097	$0	$1,029	0.94	10.01
0720	AF OPS BLDG	AHU-3	15	33	0	18	1.0	0	0	$5	0	1	0	0	$272	$0	$45	0.16	57.41
0720	AF OPS BLDG	AHU-3	15	36	0	1,160	0.0	0	0	$48	0	0	0	2	$399	$0	$421	1.05	8.33
0720	AF OPS BLDG	CH-1	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
0720	AF OPS BLDG	CH-2	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
0720	AF OPS BLDG	CH-3	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
0722	FLIGHT SIMULATOR	AHU-1	11	18	0	125,653	446.5	0	0	$7,029	1	0	0	1	$348	$0	$63,096	181.31	0.05
0722	FLIGHT SIMULATOR	AHU-1	11	32	0	4,959	35.0	0	0	$349	0	3	0	11	$2,596	$0	$3,174	1.22	7.43
0722	FLIGHT SIMULATOR	AHU-1	11	33	0	400	20.9	0	0	$103	0	1	0	0	$272	$0	$965	3.55	2.65
0722	FLIGHT SIMULATOR	AHU-1	11	36	0	11,421	0.0	0	0	$472	0	0	0	2	$399	$0	$4,142	10.38	0.85
0722	FLIGHT SIMULATOR	AHU-1	11	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0722	FLIGHT SIMULATOR	AHU-2	15	18	0	23,004	188.5	0	0	$1,727	1	0	0	1	$348	$0	$15,741	45.23	0.20
0722	FLIGHT SIMULATOR	AHU-2	15	27	0	2,386	21.0	0	0	$185	0	2	0	3	$1,097	$0	$1,691	1.54	5.92
0722	FLIGHT SIMULATOR	AHU-2	15	33	0	154	8.0	0	0	$39	0	1	0	0	$272	$0	$371	1.37	6.89
0722	FLIGHT SIMULATOR	AHU-2	15	36	0	5,495	0.0	0	0	$227	0	0	0	2	$399	$0	$1,992	4.99	1.76
0722	FLIGHT SIMULATOR	AHU-3	15	18	0	57,308	126.8	0	0	$2,889	1	0	0	1	$348	$0	$25,760	74.02	0.12
0722	FLIGHT SIMULATOR	AHU-3	15	27	0	1,288	14.0	0	0	$111	0	2	0	3	$1,097	$0	$1,018	0.93	9.89
0722	FLIGHT SIMULATOR	AHU-3	15	33	0	104	5.4	0	0	$27	0	1	0	0	$272	$0	$251	0.92	10.21
0722	FLIGHT SIMULATOR	AHU-3	15	36	0	2,967	0.0	0	0	$123	0	0	0	2	$399	$0	$1,076	2.70	3.26
0722	FLIGHT SIMULATOR	BLR-1	1	1	0	8,984	0.0	0	0	$371	2	0	0	0	$277	$0	$3,258	11.76	0.75
0722	FLIGHT SIMULATOR	BLR-1	1	2	0	0	3.4	0	0	$14	0	0	0	3	$836	$0	$134	0.16	59.45
0722	FLIGHT SIMULATOR	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0722	FLIGHT SIMULATOR	CH-1	6	10	3	9,903	0.0	0	0	$480	1	0	1	0	$386	$0	$4,199	10.88	0.80
0722	FLIGHT SIMULATOR	CH-1	6	11	0	1,225	0.0	0	0	$51	0	0	0	2	$664	$0	$444	0.67	13.12
0722	FLIGHT SIMULATOR	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
0722	FLIGHT SIMULATOR	CH-1	6	42	59	0	0.0	0	0	$1,501	1	0	0	0	$150	$0	$12,803	85.35	0.10
0722	FLIGHT SIMULATOR	CH-2	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
0723	MNT HANGAR COMB	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0723	MNT HANGAR COMB	CV-1	5	9	0	0	4.7	0	0	$19	0	1	0	3	$1,109	$0	$185	0.17	56.99
0723	MNT HANGAR COMB	HV-1	16	18	0	937	92.1	0	0	$418	1	0	0	1	$348	$0	$3,957	11.37	0.83

0723	MNT HANGAR COMB	HV-1	16	30	0	0	39.7	0	0	$163	0	1	0	3	$813	$0	$1,558	1.92	4.97
0723	MNT HANGAR COMB	RAD-1	25	23	0	3,690	0.0	3	0	$224	1	0	1	1	$570	$0	$1,952	3.43	2.54
0723	MNT HANGAR COMB	RAD-2	27	25	0	0	0.0	3	0	$72	0	1	0	1	$456	$0	$614	1.35	6.33
0723	MNT HANGAR COMB	UH-1	21	20	0	937	73.7	0	0	$342	1	0	1	2	$1,213	$0	$3,234	2.67	3.54
0723	MNT HANGAR COMB	UH-2	21	20	0	937	73.7	0	0	$342	1	0	1	2	$1,213	$0	$3,234	2.67	3.54
0723	MNT HANGAR COMB	UH-3	21	20	0	937	73.7	0	0	$342	1	0	1	2	$1,213	$0	$3,234	2.67	3.54
0723	MNT HANGAR COMB	UH-4	21	20	0	937	73.7	0	0	$342	1	0	1	2	$1,213	$0	$3,234	2.67	3.54
0724	FLIGHT SIMULATOR	AHU-1	10	18	0	50,238	235.8	0	0	$3,046	1	0	0	1	$348	$0	$27,477	78.96	0.11
0724	FLIGHT SIMULATOR	AHU-1	10	29	0	1,775	79.2	0	0	$400	0	7	0	8	$3,378	$0	$3,755	1.11	8.45
0724	FLIGHT SIMULATOR	AHU-1	10	33	0	64	3.3	0	0	$16	0	1	0	0	$272	$0	$154	0.56	16.67
0724	FLIGHT SIMULATOR	AHU-1	10	35	0	4,088	0.0	0	0	$169	0	0	0	2	$399	$0	$1,482	3.72	2.36
0724	FLIGHT SIMULATOR	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0724	FLIGHT SIMULATOR	AHU-2	15	18	0	49,792	175.7	0	0	$2,780	1	0	0	1	$348	$0	$24,952	71.70	0.13
0724	FLIGHT SIMULATOR	AHU-2	15	27	0	1,718	52.8	0	0	$289	0	2	0	3	$1,097	$0	$2,697	2.46	3.80
0724	FLIGHT SIMULATOR	AHU-2	15	33	0	62	3.2	0	0	$16	0	1	0	0	$272	$0	$149	0.55	17.22
0724	FLIGHT SIMULATOR	AHU-2	15	36	0	3,956	0.0	0	0	$163	0	0	0	2	$399	$0	$1,435	3.60	2.44
0724	FLIGHT SIMULATOR	BLR-1	1	1	0	9,346	0.0	0	0	$386	2	0	0	0	$277	$0	$3,389	12.24	0.72
0724	FLIGHT SIMULATOR	BLR-1	1	2	0	0	2.6	0	0	$11	0	0	0	3	$836	$0	$100	0.12	79.53
0724	FLIGHT SIMULATOR	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0724	FLIGHT SIMULATOR	CH-1	6	10	2	6,364	0.0	0	0	$307	1	0	1	0	$386	$0	$2,684	6.95	1.26
0724	FLIGHT SIMULATOR	CH-1	6	11	0	438	0.0	0	0	$18	0	0	0	2	$664	$0	$159	0.24	36.75
0724	FLIGHT SIMULATOR	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
0724	FLIGHT SIMULATOR	CH-1	6	42	21	0	0.0	0	0	$536	1	0	0	0	$150	$0	$4,572	30.48	0.28
0724	FLIGHT SIMULATOR	CH-2	6	10	1	2,422	0.0	0	0	$117	1	0	1	0	$386	$0	$1,022	2.65	3.30
0724	FLIGHT SIMULATOR	CH-2	6	11	0	350	0.0	0	0	$14	0	0	0	2	$664	$0	$127	0.19	45.94
0724	FLIGHT SIMULATOR	CH-2	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
0724	FLIGHT SIMULATOR	CH-2	6	42	17	0	0.0	0	0	$429	1	0	0	0	$150	$0	$3,658	24.39	0.35
0724	FLIGHT SIMULATOR	CH-3	8	17	0	0	0.0	3	0	$72	1	0	1	0	$243	$0	$614	2.53	3.38
0724	FLIGHT SIMULATOR	CH-4	8	17	0	0	0.0	3	0	$72	1	0	1	0	$243	$0	$614	2.53	3.38
0727	MNT HANGAR COMB	ACCU-1	8	17	13	280	0.0	3	0	$427	1	0	1	0	$243	$0	$3,642	14.99	0.57
0727	MNT HANGAR COMB	ACCU-2	8	17	13	263	0.0	3	0	$404	1	0	1	0	$243	$0	$3,453	14.21	0.60
0727	MNT HANGAR COMB	AHU-1	15	18	7	56,561	114.3	0	0	$2,997	1	0	0	1	$348	$0	$26,620	76.50	0.12
0727	MNT HANGAR COMB	AHU-1	15	27	0	2,821	49.9	0	0	$322	0	2	0	3	$1,097	$0	$2,984	2.72	3.40
0727	MNT HANGAR COMB	AHU-1	15	33	0	40	2.5	0	0	$12	0	1	0	0	$272	$0	$115	0.42	22.34
0727	MNT HANGAR COMB	AHU-1	15	36	0	963	0.0	0	0	$40	0	0	0	2	$399	$0	$349	0.87	10.04
0727	MNT HANGAR COMB	AHU-2	15	18	2	13,079	37.5	0	0	$740	1	0	0	1	$348	$0	$6,598	18.96	0.47
0727	MNT HANGAR COMB	AHU-2	15	27	0	642	20.8	0	0	$112	0	2	0	3	$1,097	$0	$1,050	0.96	9.77
0727	MNT HANGAR COMB	AHU-2	15	33	0	9	0.6	0	0	$3	0	1	0	0	$272	$0	$26	0.10	98.11
0727	MNT HANGAR COMB	AHU-2	15	36	0	219	0.0	0	0	$9	0	0	0	2	$399	$0	$79	0.20	44.08
0727	MNT HANGAR COMB	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0727	MNT HANGAR COMB	BLR-2	1	1	0	10,620	0.0	0	0	$439	2	0	0	0	$277	$0	$3,851	13.90	0.63

[illegible]	[illegible]	[illegible]	[illegible]	FUNCTN NUMBER	SVGS PER YR	SVGS PER YR	SVGS PER YR	HOUR SVGS PER YR	SVGS PER YR	COST SVGS PER YR	PNT	PNT	PNT	PNT	CONSTR COST	PER YR	[illegible]	[illegible]	[illegible]
0727	MNT HANGAR COMB	BLR-2	1	2	0	0	2.6	0	0	$11	0	0	0	3	$836	$0	$100	0.12	79.53
0727	MNT HANGAR COMB	BLR-2	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0727	MNT HANGAR COMB	CV-1	5	8	0	3,658	0.0	0	0	$151	1	0	1	0	$386	$0	$1,326	3.44	2.56
0727	MNT HANGAR COMB	CV-1	5	9	0	0	5.7	0	0	$23	0	1	0	3	$1,109	$0	$223	0.20	47.47
0727	MNT HANGAR COMB	HV-1	16	18	0	1,917	104.3	0	0	$509	1	0	0	1	$348	$0	$4,791	13.77	0.68
0727	MNT HANGAR COMB	HV-1	16	30	0	0	44.9	0	0	$185	0	1	0	3	$813	$0	$1,763	2.17	4.39
0727	MNT HANGAR COMB	RAD-1	25	23	0	10,261	0.0	3	0	$496	1	0	1	1	$570	$0	$4,335	7.61	1.15
0727	MNT HANGAR COMB	UH-1	21	20	0	1,285	97.8	0	0	$456	1	0	1	2	$1,213	$0	$4,305	3.55	2.66
0727	MNT HANGAR COMB	UH-2	21	20	0	1,285	97.8	0	0	$456	1	0	1	2	$1,213	$0	$4,305	3.55	2.66
0727	MNT HANGAR COMB	UH-3	21	20	0	1,285	97.8	0	0	$456	1	0	1	2	$1,213	$0	$4,305	3.55	2.66
0727	MNT HANGAR COMB	UH-4	21	20	0	1,285	97.8	0	0	$456	1	0	1	2	$1,213	$0	$4,305	3.55	2.66
0741	MNT HANGAR COMB	AHU-1	15	18	0	15,509	350.7	0	0	$2,085	1	0	0	1	$348	$0	$19,394	55.73	0.17
0741	MNT HANGAR COMB	AHU-1	15	27	0	0	151.0	0	0	$622	0	2	0	3	$1,097	$0	$5,928	5.40	1.76
0741	MNT HANGAR COMB	AHU-2	15	18	0	15,509	350.7	0	0	$2,085	1	0	0	1	$348	$0	$19,394	55.73	0.17
0741	MNT HANGAR COMB	AHU-2	15	27	0	0	151.0	0	0	$622	0	2	0	3	$1,097	$0	$5,928	5.40	1.76
0741	MNT HANGAR COMB	AHU-3	15	18	0	15,509	350.7	0	0	$2,085	1	0	0	1	$348	$0	$19,394	55.73	0.17
0741	MNT HANGAR COMB	AHU-3	15	27	0	0	151.0	0	0	$622	0	2	0	3	$1,097	$0	$5,928	5.40	1.76
0741	MNT HANGAR COMB	AHU-4	15	18	0	15,509	350.7	0	0	$2,085	1	0	0	1	$348	$0	$19,394	55.73	0.17
0741	MNT HANGAR COMB	AHU-4	15	27	0	0	151.0	0	0	$622	0	2	0	3	$1,097	$0	$5,928	5.40	1.76
0741	MNT HANGAR COMB	BLR-1	4	6	0	0	670.0	26	0	$3,384	0	0	4	4	$5,286	$0	$31,629	5.98	1.56
0751	AC PTS & TOE ST	AHU-1	15	18	1	3,625	33.9	0	0	$305	1	0	0	1	$348	$0	$2,780	7.99	1.14
0751	AC PTS & TOE ST	AHU-1	15	27	0	59	10.9	0	0	$47	0	2	0	3	$1,097	$0	$449	0.41	23.20
0751	AC PTS & TOE ST	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0751	AC PTS & TOE ST	CH-1	8	17	3	53	0.0	3	0	$138	1	0	1	0	$243	$0	$1,182	4.86	1.75
0751	AC PTS & TOE ST	UH-1	21	20	0	9,249	305.1	0	0	$1,639	1	0	1	2	$1,213	$0	$15,332	12.64	0.74
0760	BN HQ BLDG	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
0760	BN HQ BLDG	RAD-1	27	25	0	0	0.0	3	0	$72	0	1	0	1	$456	$0	$614	1.35	6.33
0802	BN ADMIN & CLRM	AHU-1	10	18	42	182,973	289.3	0	0	$9,822	1	0	0	1	$348	$0	$86,864	249.61	0.04
0802	BN ADMIN & CLRM	AHU-1	10	29	0	4,343	174.0	0	0	$896	0	7	0	8	$3,378	$0	$8,407	2.49	3.77
0802	BN ADMIN & CLRM	AHU-1	10	33	0	60	3.8	0	0	$18	0	1	0	0	$272	$0	$169	0.62	15.16
0802	BN ADMIN & CLRM	AHU-1	10	35	0	1,482	0.0	0	0	$61	0	0	0	2	$399	$0	$537	1.35	6.52
0802	BN ADMIN & CLRM	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0802	BN ADMIN & CLRM	CWP-1	26	24	0	1,232	0.0	3	0	$132	1	0	1	0	$386	$0	$1,136	2.94	2.93
0802	BN ADMIN & CLRM	HWP-1	26	24	0	3,777	0.0	3	0	$228	1	0	1	0	$386	$0	$1,984	5.14	1.69
0804	RGT HQ BUILD	AHU-1	10	18	11	41,817	29.0	0	0	$2,127	1	0	0	1	$348	$0	$18,692	53.71	0.16
0804	RGT HQ BUILD	AHU-1	10	29	0	1,517	86.6	0	0	$419	0	7	0	8	$3,378	$0	$3,951	1.17	8.05
0804	RGT HQ BUILD	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0804	RGT HQ BUILD	DTWP-1	24	22	3	8,971	0.0	3	0	$513	1	0	1	4	$1,418	$0	$4,469	3.15	2.76
0806	COMB AC-HTG PLANT	BLR-1	1	1	0	4,132	0.0	0	0	$171	2	0	0	0	$277	$0	$1,498	5.41	1.62
0806	COMB AC-HTG PLANT	BLR-1	1	2	0	0	9.1	0	0	$37	0	0	0	3	$836	$0	$356	0.43	22.37
0806	COMB AC-HTG PLANT	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44

						KWH SVGS. PER YR	SVGS PER YR	HOUR SVGS PER YR	MATRL $VGS PER YR	$VGS PER YR									
0806	COMB AC-HTG PLANT	BLR-2	1	1	0	4,132	0.0	0	0	$171	2	0	0	0	$277	$0	$1,498	5.41	1.62
0806	COMB AC-HTG PLANT	BLR-2	1	2	0	0	9.1	0	0	$37	0	0	0	3	$836	$0	$356	0.43	22.37
0806	COMB AC-HTG PLANT	BLR-2	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0806	COMB AC-HTG PLANT	CH-1	7	10	8	3,149	0.0	0	0	$331	1	0	1	0	$386	$0	$2,859	7.41	1.17
0806	COMB AC-HTG PLANT	CH-1	7	12	0	1,225	0.0	0	0	$51	0	0	0	4	$1,133	$0	$444	0.39	22.39
0806	COMB AC-HTG PLANT	CH-1	7	16	0	0	0.0	6	0	$144	0	0	2	0	$281	$0	$1,228	4.37	1.95
0806	COMB AC-HTG PLANT	CH-1	7	43	59	0	0.0	0	0	$1,501	5	0	0	0	$530	$0	$12,803	24.16	0.35
0806	COMB AC-HTG PLANT	CH-2	7	10	8	3,149	0.0	0	0	$331	1	0	1	0	$386	$0	$2,859	7.41	1.17
0806	COMB AC-HTG PLANT	CH-2	7	12	0	1,225	0.0	0	0	$51	0	0	0	4	$1,133	$0	$444	0.39	22.39
0806	COMB AC-HTG PLANT	CH-2	7	16	0	0	0.0	6	0	$144	0	0	2	0	$281	$0	$1,228	4.37	1.95
0806	COMB AC-HTG PLANT	CH-2	7	43	59	0	0.0	0	0	$1,501	5	0	0	0	$530	$0	$12,803	24.16	0.35
0808	BN ADMIN & CLRM	AHU-1	10	18	42	182,973	289.3	0	0	$9,822	1	0	0	1	$348	$0	$86,864	249.61	0.04
0808	BN ADMIN & CLRM	AHU-1	10	29	0	4,343	174.0	0	0	$896	0	7	0	8	$3,378	$0	$8,407	2.49	3.77
0808	BN ADMIN & CLRM	AHU-1	10	33	0	60	3.8	0	0	$18	0	1	0	0	$272	$0	$169	0.62	15.16
0808	BN ADMIN & CLRM	AHU-1	10	35	0	1,482	0.0	0	0	$61	0	0	0	2	$399	$0	$537	1.35	6.52
0808	BN ADMIN & CLRM	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0808	BN ADMIN & CLRM	CWP-1	26	24	0	1,232	0.0	3	0	$132	1	0	1	0	$386	$0	$1,136	2.94	2.93
0808	BN ADMIN & CLRM	HWP-1	26	24	0	3,777	0.0	3	0	$228	1	0	1	0	$386	$0	$1,984	5.14	1.69
0810	ADMIN & SUPPLY BLDG	CWP-1	26	24	2	5,315	0.0	3	0	$336	1	0	1	0	$386	$0	$2,918	7.56	1.15
0810	ADMIN & SUPPLY BLDG	DTWP-1	24	22	8	23,050	0.0	3	0	$1,237	1	0	1	4	$1,418	$0	$10,790	7.61	1.15
0810	ADMIN & SUPPLY BLDG	DTWP-2	24	22	5	12,745	0.0	3	0	$716	1	0	1	4	$1,418	$0	$6,240	4.40	1.98
0810	ADMIN & SUPPLY BLDG	FC-1	19	20	0	14,466	155.5	0	0	$1,238	1	0	1	2	$1,213	$0	$11,350	9.36	0.98
0810	ADMIN & SUPPLY BLDG	HV-1	16	18	0	3,078	66.8	0	0	$402	1	0	0	1	$348	$0	$3,737	10.74	0.87
0810	ADMIN & SUPPLY BLDG	HV-1	16	30	0	0	21.4	0	0	$88	0	1	0	3	$813	$0	$842	1.04	9.20
0810	ADMIN & SUPPLY BLDG	HV-2	16	18	0	3,078	66.8	0	0	$402	1	0	0	1	$348	$0	$3,737	10.74	0.87
0810	ADMIN & SUPPLY BLDG	HV-2	16	30	0	0	21.4	0	0	$88	0	1	0	3	$813	$0	$842	1.04	9.20
0810	ADMIN & SUPPLY BLDG	HV-3	16	18	0	3,078	66.8	0	0	$402	1	0	0	1	$348	$0	$3,737	10.74	0.87
0810	ADMIN & SUPPLY BLDG	HV-3	16	30	0	0	21.4	0	0	$88	0	1	0	3	$813	$0	$842	1.04	9.20
0810	ADMIN & SUPPLY BLDG	HV-4	16	18	0	3,078	66.8	0	0	$402	1	0	0	1	$348	$0	$3,737	10.74	0.87
0810	ADMIN & SUPPLY BLDG	HV-4	16	30	0	0	21.4	0	0	$88	0	1	0	3	$813	$0	$842	1.04	9.20
0812	ADMIN & SUPPORT BLDG	DTWP-1	24	22	5	16,954	0.0	3	0	$902	1	0	1	4	$1,418	$0	$7,872	5.55	1.57
0812	ADMIN & SUPPORT BLDG	DTWP-2	24	22	5	15,345	0.0	3	0	$824	1	0	1	4	$1,418	$0	$7,183	5.07	1.72
0812	ADMIN & SUPPORT BLDG	FC-1	19	20	0	8,470	243.1	0	0	$1,351	1	0	1	2	$1,213	$0	$12,614	10.40	0.90
0812	ADMIN & SUPPORT BLDG	HV-1	16	18	0	5,169	82.8	0	0	$555	1	0	0	1	$348	$0	$5,124	14.73	0.63
0812	ADMIN & SUPPORT BLDG	HV-1	16	30	0	0	26.6	0	0	$110	0	1	0	3	$813	$0	$1,044	1.28	7.42
0812	ADMIN & SUPPORT BLDG	HV-2	16	18	0	8,191	82.8	0	0	$679	1	0	0	1	$348	$0	$6,220	17.87	0.51
0812	ADMIN & SUPPORT BLDG	HV-2	16	30	0	0	26.6	0	0	$110	0	1	0	3	$813	$0	$1,044	1.28	7.42
0812	ADMIN & SUPPORT BLDG	HV-3	16	18	0	8,191	82.8	0	0	$679	1	0	0	1	$348	$0	$6,220	17.87	0.51
0812	ADMIN & SUPPORT BLDG	HV-3	16	30	0	0	26.6	0	0	$110	0	1	0	3	$813	$0	$1,044	1.28	7.42
0812	ADMIN & SUPPORT BLDG	HV-4	16	18	0	8,191	82.8	0	0	$679	1	0	0	1	$348	$0	$6,220	17.87	0.51
0812	ADMIN & SUPPORT BLDG	HV-4	16	30	0	0	26.6	0	0	$110	0	1	0	3	$813	$0	$1,044	1.28	7.42

0812	ADMIN & SUPPORT BLDG	HV-5	16	18	0	8,191	82.8	0	0	$679	1	0	0	1	$348	$0	$6,220	17.87	0.51
0812	ADMIN & SUPPORT BLDG	HV-5	16	30	0	0	26.6	0	0	$110	0	1	0	3	$813	$0	$1,044	1.28	7.42
0814	MEDICAL FAC - NEW	AHU-1	10	18	11	52,414	501.2	0	0	$4,510	1	0	0	1	$348	$0	$41,073	118.03	0.08
0814	MEDICAL FAC - NEW	AHU-1	10	29	0	1,396	20.4	0	0	$142	0	7	0	8	$3,378	$0	$1,309	0.39	23.81
0814	MEDICAL FAC - NEW	AHU-1	10	33	0	554	23.0	0	0	$117	0	1	0	0	$272	$0	$1,102	4.05	2.32
0814	MEDICAL FAC - NEW	AHU-1	10	35	0	3,660	0.0	0	0	$151	0	0	0	2	$399	$0	$1,327	3.33	2.64
0814	MEDICAL FAC - NEW	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0814	MEDICAL FAC - NEW	BLR-1	1	1	0	6,490	0.0	0	0	$268	2	0	0	0	$277	$0	$2,353	8.50	1.03
0814	MEDICAL FAC - NEW	BLR-1	1	2	0	0	4.0	0	0	$17	0	0	0	3	$836	$0	$158	0.19	50.58
0814	MEDICAL FAC - NEW	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0814	MEDICAL FAC - NEW	CH-1	6	10	1	4,648	0.0	0	0	$225	1	0	1	0	$386	$0	$1,965	5.09	1.72
0814	MEDICAL FAC - NEW	CH-1	6	11	0	350	0.0	0	0	$14	0	0	0	2	$664	$0	$127	0.19	45.94
0814	MEDICAL FAC - NEW	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
0814	MEDICAL FAC - NEW	CH-1	6	42	17	0	0.0	0	0	$429	1	0	0	0	$150	$0	$3,658	24.39	0.35
0814	MEDICAL FAC - NEW	CWP-1	26	24	1	4,231	0.0	3	0	$277	1	0	1	0	$386	$0	$2,403	6.23	1.40
0814	MEDICAL FAC - NEW	RAD-1	25	23	0	6,490	0.0	3	0	$340	1	0	1	1	$570	$0	$2,967	5.21	1.68
0817	MNT HANGAR AVUM	AHU-1	15	18	1	10,844	26.5	0	0	$581	1	0	0	1	$348	$0	$5,173	14.86	0.60
0817	MNT HANGAR AVUM	AHU-1	15	27	0	824	5.6	0	0	$57	0	2	0	3	$1,097	$0	$518	0.47	19.25
0817	MNT HANGAR AVUM	AHU-1	15	33	0	16	1.0	0	0	$5	0	1	0	0	$272	$0	$44	0.16	57.79
0817	MNT HANGAR AVUM	AHU-1	15	36	0	281	0.0	0	0	$12	0	0	0	2	$399	$0	$102	0.26	34.36
0817	MNT HANGAR AVUM	AHU-2	15	18	1	10,067	24.6	0	0	$540	1	0	0	1	$348	$0	$4,815	13.84	0.64
0817	MNT HANGAR AVUM	AHU-2	15	27	0	744	5.6	0	0	$54	0	2	0	3	$1,097	$0	$488	0.45	20.44
0817	MNT HANGAR AVUM	AHU-2	15	33	0	14	0.9	0	0	$4	0	1	0	0	$272	$0	$40	0.15	64.05
0817	MNT HANGAR AVUM	AHU-2	15	36	0	254	0.0	0	0	$10	0	0	0	2	$399	$0	$92	0.23	38.08
0817	MNT HANGAR AVUM	AHU-3	15	18	2	22,091	45.7	0	0	$1,164	1	0	0	1	$348	$0	$10,343	29.72	0.30
0817	MNT HANGAR AVUM	AHU-3	15	27	0	1,487	8.4	0	0	$96	0	2	0	3	$1,097	$0	$867	0.79	11.45
0817	MNT HANGAR AVUM	AHU-3	15	33	0	28	1.8	0	0	$8	0	1	0	0	$272	$0	$80	0.29	32.02
0817	MNT HANGAR AVUM	AHU-3	15	36	0	507	0.0	0	0	$21	0	0	0	2	$399	$0	$184	0.46	19.04
0817	MNT HANGAR AVUM	BLR-1	1	1	0	6,807	0.0	0	0	$281	2	0	0	0	$277	$0	$2,468	8.91	0.99
0817	MNT HANGAR AVUM	BLR-1	1	2	0	0	21.4	0	0	$88	0	0	0	3	$836	$0	$839	1.00	9.50
0817	MNT HANGAR AVUM	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0817	MNT HANGAR AVUM	CH-1	8	17	3	70	0.0	3	0	$161	1	0	1	0	$243	$0	$1,371	5.64	1.51
0817	MNT HANGAR AVUM	CH-2	8	17	3	70	0.0	3	0	$161	1	0	1	0	$243	$0	$1,371	5.64	1.51
0817	MNT HANGAR AVUM	CH-3	8	17	7	140	0.0	3	0	$249	1	0	1	0	$243	$0	$2,128	8.76	0.97
0817	MNT HANGAR AVUM	H&V-1	16	18	0	28,164	43.6	0	0	$1,343	1	0	0	1	$348	$0	$11,926	34.27	0.26
0817	MNT HANGAR AVUM	H&V-1	16	30	0	0	18.8	0	0	$77	0	1	0	3	$813	$0	$738	0.91	10.50
0817	MNT HANGAR AVUM	H&V-2	16	18	0	28,164	43.6	0	0	$1,343	1	0	0	1	$348	$0	$11,926	34.27	0.26
0817	MNT HANGAR AVUM	H&V-2	16	30	0	0	18.8	0	0	$77	0	1	0	3	$813	$0	$738	0.91	10.50
0817	MNT HANGAR AVUM	H&V-3	16	18	0	28,164	43.6	0	0	$1,343	1	0	0	1	$348	$0	$11,926	34.27	0.26
0817	MNT HANGAR AVUM	H&V-3	16	30	0	0	18.8	0	0	$77	0	1	0	3	$813	$0	$738	0.91	10.50
0817	MNT HANGAR AVUM	H&V-4	16	18	0	28,164	43.6	0	0	$1,343	1	0	0	1	$348	$0	$11,926	34.27	0.26

0817	MNT HANGAR AVUM	H&V-4	16	30	0	0	18.8	0	0	$77	0	1	0	3	$813	$0	$738	0.91	10.50
0817	MNT HANGAR AVUM	H&V-5	16	18	0	6,196	69.8	0	0	$544	1	0	0	1	$348	$0	$4,988	14.33	0.64
0817	MNT HANGAR AVUM	H&V-5	16	30	0	0	30.1	0	0	$124	0	1	0	3	$813	$0	$1,180	1.45	6.56
0817	MNT HANGAR AVUM	H&V-6	16	18	0	4,898	43.6	0	0	$382	1	0	0	1	$348	$0	$3,490	10.03	0.91
0817	MNT HANGAR AVUM	H&V-6	16	30	0	0	18.8	0	0	$77	0	1	0	3	$813	$0	$738	0.91	10.50
0817	MNT HANGAR AVUM	HWP-1	26	24	0	6,196	0.0	3	0	$328	1	0	1	0	$386	$0	$2,861	7.41	1.18
0817	MNT HANGAR AVUM	RAD-1	25	23	0	56,327	0.0	3	0	$2,398	1	0	1	1	$570	$0	$21,039	36.91	0.24
0820	TAC EQUIP SHOP	ACCU-1	8	17	10	210	0.0	3	0	$338	1	0	1	0	$243	$0	$2,885	11.87	0.72
0820	TAC EQUIP SHOP	AHU-1	15	18	15	80,930	202.3	0	0	$4,556	1	0	0	1	$348	$0	$40,532	116.47	0.08
0820	TAC EQUIP SHOP	AHU-1	15	27	0	2,449	116.0	0	0	$579	0	2	0	3	$1,097	$0	$5,441	4.96	1.89
0820	TAC EQUIP SHOP	AHU-1	15	33	0	45	2.8	0	0	$14	0	1	0	0	$272	$0	$128	0.47	20.01
0820	TAC EQUIP SHOP	AHU-1	15	36	0	836	0.0	0	0	$35	0	0	0	2	$399	$0	$303	0.76	11.56
0820	TAC EQUIP SHOP	BLR-1	1	1	0	30,167	0.0	0	0	$1,246	2	0	0	0	$277	$0	$10,939	39.49	0.22
0820	TAC EQUIP SHOP	BLR-1	1	2	0	0	16.4	0	0	$68	0	0	0	3	$836	$0	$645	0.77	12.35
0820	TAC EQUIP SHOP	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0820	TAC EQUIP SHOP	HV-1	16	18	0	9,829	161.5	0	0	$1,071	1	0	0	1	$348	$0	$9,904	28.46	0.32
0820	TAC EQUIP SHOP	HV-1	16	30	0	0	69.5	0	0	$286	0	1	0	3	$813	$0	$2,729	3.36	2.84
0820	TAC EQUIP SHOP	MAU-1	16	18	0	9,829	161.5	0	0	$1,071	1	0	0	1	$348	$0	$9,904	28.46	0.32
0820	TAC EQUIP SHOP	MAU-1	16	30	0	0	69.5	0	0	$286	0	1	0	3	$813	$0	$2,729	3.36	2.84
0820	TAC EQUIP SHOP	MAU-2	16	18	0	9,829	161.5	0	0	$1,071	1	0	0	1	$348	$0	$9,904	28.46	0.32
0820	TAC EQUIP SHOP	MAU-2	16	30	0	0	69.5	0	0	$286	0	1	0	3	$813	$0	$2,729	3.36	2.84
0833	AIRCRAFT HANGAR	AHU-1	15	18	1	12,284	0.0	0	0	$521	1	0	0	1	$348	$0	$4,567	13.12	0.67
0833	AIRCRAFT HANGAR	AHU-1	15	27	0	1,220	0.0	0	0	$50	0	2	0	3	$1,097	$0	$442	0.40	21.78
0833	AIRCRAFT HANGAR	AHU-1	15	33	0	56	0.0	0	0	$2	0	1	0	0	$272	$0	$20	0.07	117.61
0833	AIRCRAFT HANGAR	AHU-1	15	36	0	416	0.0	0	0	$17	0	0	0	2	$399	$0	$151	0.38	23.23
0833	AIRCRAFT HANGAR	AHU-2	15	18	1	10,819	0.0	0	0	$460	1	0	0	1	$348	$0	$4,036	11.60	0.76
0833	AIRCRAFT HANGAR	AHU-2	15	27	0	1,050	0.0	0	0	$43	0	2	0	3	$1,097	$0	$381	0.35	25.29
0833	AIRCRAFT HANGAR	AHU-2	15	33	0	48	0.0	0	0	$2	0	1	0	0	$272	$0	$17	0.06	136.58
0833	AIRCRAFT HANGAR	AHU-2	15	36	0	358	0.0	0	0	$15	0	0	0	2	$399	$0	$130	0.33	26.98
0833	AIRCRAFT HANGAR	BLR-1	1	1	0	16,072	0.0	0	0	$664	2	0	0	0	$277	$0	$5,828	21.04	0.42
0833	AIRCRAFT HANGAR	BLR-1	1	2	0	0	22.7	0	0	$93	0	0	0	3	$836	$0	$890	1.07	8.95
0833	AIRCRAFT HANGAR	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0833	AIRCRAFT HANGAR	CH-1	8	17	5	105	0.0	3	0	$205	1	0	1	0	$243	$0	$1,750	7.20	1.19
0833	AIRCRAFT HANGAR	CH-2	8	17	3	70	0.0	3	0	$161	1	0	1	0	$243	$0	$1,371	5.64	1.51
0833	AIRCRAFT HANGAR	H&V-1	16	18	0	14,339	142.9	0	0	$1,181	1	0	0	1	$348	$0	$10,810	31.06	0.29
0833	AIRCRAFT HANGAR	H&V-1	16	30	0	0	61.5	0	0	$253	0	1	0	3	$813	$0	$2,416	2.97	3.21
0833	AIRCRAFT HANGAR	H&V-2	16	18	0	8,886	142.9	0	0	$956	1	0	0	1	$348	$0	$8,833	25.38	0.36
0833	AIRCRAFT HANGAR	H&V-2	16	30	0	0	61.5	0	0	$253	0	1	0	3	$813	$0	$2,416	2.97	3.21
0833	AIRCRAFT HANGAR	HWP-1	26	24	0	14,339	0.0	3	0	$664	1	0	1	0	$386	$0	$5,814	15.06	0.58
0833	AIRCRAFT HANGAR	RAD-1	25	23	0	12,000	0.0	3	0	$568	1	0	1	1	$570	$0	$4,966	8.71	1.00
0835	MAF OPS BLDG	AHU-1	11	18	11	138,754	276.1	0	0	$7,148	1	0	0	1	$348	$0	$63,545	182.60	0.05

0835	MAF OPS BLDG	AHU-1	11	32	0	12,362	81.9	0	0	$848	0	3	0	11	$4,794	$0	$7,697	1.61	5.65
0835	MAF OPS BLDG	AHU-1	11	33	0	145	9.1	0	0	$44	0	1	0	0	$272	$0	$411	1.51	6.23
0835	MAF OPS BLDG	AHU-1	11	36	0	4,218	0.0	0	0	$174	0	0	0	2	$399	$0	$1,529	3.83	2.29
0835	MAF OPS BLDG	AHU-1	11	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
0835	MAF OPS BLDG	CH-1	8	17	21	438	0.0	3	0	$626	1	0	1	0	$243	$0	$5,345	22.00	0.39
0835	MAF OPS BLDG	RAD-1	25	23	0	9,487	0.0	3	0	$464	1	0	1	1	$570	$0	$4,054	7.11	1.23
0840	VEHICLE MNT SHOP ORG	AHU-1	15	18	2	17,300	50.6	0	0	$986	1	0	0	1	$348	$0	$8,798	25.28	0.35
0840	VEHICLE MNT SHOP ORG	AHU-1	15	27	0	798	22.9	0	0	$127	0	2	0	3	$1,097	$0	$1,190	1.08	8.61
0840	VEHICLE MNT SHOP ORG	AHU-1	15	33	0	17	1.1	0	0	$5	0	1	0	0	$272	$0	$49	0.18	52.64
0840	VEHICLE MNT SHOP ORG	AHU-1	15	36	0	272	0.0	0	0	$11	0	0	0	2	$399	$0	$99	0.25	35.47
0840	VEHICLE MNT SHOP ORG	BLR-1	1	1	0	5,130	0.0	0	0	$212	2	0	0	0	$277	$0	$1,860	6.72	1.31
0840	VEHICLE MNT SHOP ORG	BLR-1	1	2	0	0	3.4	0	0	$14	0	0	0	3	$836	$0	$134	0.16	59.65
0840	VEHICLE MNT SHOP ORG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0840	VEHICLE MNT SHOP ORG	CH-1	8	17	5	105	0.0	3	0	$205	1	0	1	0	$243	$0	$1,750	7.20	1.19
0840	VEHICLE MNT SHOP ORG	HV-1	16	18	0	9,612	0.0	0	0	$397	1	0	0	1	$348	$0	$3,485	10.02	0.88
0840	VEHICLE MNT SHOP ORG	HV-1	16	30	0	0	123.4	0	0	$509	0	1	0	3	$813	$0	$4,847	5.96	1.60
0840	VEHICLE MNT SHOP ORG	MAU-1	16	18	0	9,612	18.0	0	0	$471	1	0	0	1	$348	$0	$4,191	12.04	0.74
0840	VEHICLE MNT SHOP ORG	MAU-1	16	30	0	0	7.7	0	0	$32	0	1	0	3	$813	$0	$304	0.37	25.51
0840	VEHICLE MNT SHOP ORG	RAD-1	20	20	0	1,285	89.8	0	0	$423	1	0	1	2	$1,213	$0	$3,993	3.29	2.87
0853	MNT HANGAR AVUM	AHU-1	15	18	3	28,671	77.9	0	0	$1,585	1	0	0	1	$348	$0	$14,133	40.61	0.22
0853	MNT HANGAR AVUM	AHU-1	15	27	0	1,749	14.0	0	0	$130	0	2	0	3	$1,097	$0	$1,186	1.08	8.43
0853	MNT HANGAR AVUM	AHU-1	15	33	0	47	3.0	0	0	$14	0	1	0	0	$272	$0	$133	0.49	19.21
0853	MNT HANGAR AVUM	AHU-1	15	36	0	597	0.0	0	0	$25	0	0	0	2	$399	$0	$216	0.54	16.18
0853	MNT HANGAR AVUM	AHU-2	15	18	3	26,808	71.8	0	0	$1,483	1	0	0	1	$348	$0	$13,219	37.99	0.23
0853	MNT HANGAR AVUM	AHU-2	15	27	0	1,575	14.0	0	0	$123	0	2	0	3	$1,097	$0	$1,122	1.02	8.93
0853	MNT HANGAR AVUM	AHU-2	15	33	0	42	2.7	0	0	$13	0	1	0	0	$272	$0	$120	0.44	21.35
0853	MNT HANGAR AVUM	AHU-2	15	36	0	537	0.0	0	0	$22	0	0	0	2	$399	$0	$195	0.49	17.98
0853	MNT HANGAR AVUM	AHU-3	15	18	3	28,671	77.9	0	0	$1,585	1	0	0	1	$348	$0	$14,133	40.61	0.22
0853	MNT HANGAR AVUM	AHU-3	15	27	0	1,749	14.0	0	0	$130	0	2	0	3	$1,097	$0	$1,186	1.08	8.43
0853	MNT HANGAR AVUM	AHU-3	15	33	0	47	3.0	0	0	$14	0	1	0	0	$272	$0	$133	0.49	19.21
0853	MNT HANGAR AVUM	AHU-3	15	36	0	597	0.0	0	0	$25	0	0	0	2	$399	$0	$216	0.54	16.18
0853	MNT HANGAR AVUM	BLR-1	1	1	0	30,315	0.0	0	0	$1,252	2	0	0	0	$277	$0	$10,993	39.68	0.22
0853	MNT HANGAR AVUM	BLR-1	1	2	0	0	20.5	0	0	$84	0	0	0	3	$836	$0	$803	0.96	9.92
0853	MNT HANGAR AVUM	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
0853	MNT HANGAR AVUM	CH-1	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
0853	MNT HANGAR AVUM	CH-2	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
0853	MNT HANGAR AVUM	CH-3	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
0853	MNT HANGAR AVUM	HV-1	16	18	0	9,394	174.2	0	0	$1,106	1	0	0	1	$348	$0	$10,248	29.45	0.31
0853	MNT HANGAR AVUM	HV-1	16	30	0	0	19.7	0	0	$81	0	1	0	3	$813	$0	$772	0.95	10.04
0853	MNT HANGAR AVUM	HV-1	16	33	0	0	11.9	0	0	$49	0	1	0	0	$272	$0	$469	1.72	5.53
0853	MNT HANGAR AVUM	HV-2	16	18	0	9,394	180.2	0	0	$1,130	1	0	0	1	$348	$0	$10,480	30.12	0.31

0853	MNT HANGAR AVUM	HV-2	16	30	0	0	22.5	0	0	$93	0	1	0	3	$813	$0	$882	1.09	8.78
0853	MNT HANGAR AVUM	HV-2	16	33	0	0	12.1	0	0	$50	0	1	0	0	$272	$0	$477	1.75	5.44
0853	MNT HANGAR AVUM	MAU-1	16	18	0	9,394	0.0	0	0	$388	1	0	0	1	$348	$0	$3,406	9.79	0.90
0853	MNT HANGAR AVUM	MAU-1	16	30	0	0	90.7	0	0	$374	0	1	0	3	$813	$0	$3,561	4.38	2.18
0853	MNT HANGAR AVUM	MAU-2	16	18	0	9,394	0.0	0	0	$388	1	0	0	1	$348	$0	$3,406	9.79	0.90
0853	MNT HANGAR AVUM	MAU-2	16	30	0	0	90.7	0	0	$374	0	1	0	3	$813	$0	$3,561	4.38	2.18
0853	MNT HANGAR AVUM	MAU-3	16	18	0	9,394	0.0	0	0	$388	1	0	0	1	$348	$0	$3,406	9.79	0.90
0853	MNT HANGAR AVUM	MAU-3	16	30	0	0	90.7	0	0	$374	0	1	0	3	$813	$0	$3,561	4.38	2.18
0853	MNT HANGAR AVUM	MAU-4	16	18	0	9,394	0.0	0	0	$388	1	0	0	1	$348	$0	$3,406	9.79	0.90
0853	MNT HANGAR AVUM	MAU-4	16	30	0	0	90.7	0	0	$374	0	1	0	3	$813	$0	$3,561	4.38	2.18
0853	MNT HANGAR AVUM	RAD-1	25	23	0	18,788	0.0	3	0	$848	1	0	1	1	$570	$0	$7,427	13.03	0.67
1470	AR VEH MNT SHOP	ACCU-1	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
1470	AR VEH MNT SHOP	ACCU-2	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
1470	AR VEH MNT SHOP	AHU-1	15	18	1	18,154	91.3	0	0	$1,142	1	0	0	1	$348	$0	$10,304	29.61	0.30
1470	AR VEH MNT SHOP	AHU-1	15	27	0	1,367	21.7	0	0	$146	0	2	0	3	$1,097	$0	$1,348	1.23	7.52
1470	AR VEH MNT SHOP	AHU-2	15	18	1	14,765	54.8	0	0	$851	1	0	0	1	$348	$0	$7,639	21.95	0.41
1470	AR VEH MNT SHOP	AHU-2	15	27	0	1,093	10.9	0	0	$90	0	2	0	3	$1,097	$0	$823	0.75	12.20
1470	AR VEH MNT SHOP	AHU-2	15	33	0	31	2.0	0	0	$9	0	1	0	0	$272	$0	$89	0.33	28.82
1470	AR VEH MNT SHOP	AHU-2	15	36	0	373	0.0	0	0	$15	0	0	0	2	$399	$0	$135	0.34	25.90
1470	AR VEH MNT SHOP	BLR-1	1	1	0	6,490	0.0	0	0	$268	2	0	0	0	$277	$0	$2,353	8.50	1.03
1470	AR VEH MNT SHOP	BLR-1	1	2	0	0	5.6	0	0	$23	0	0	0	3	$836	$0	$220	0.26	36.15
1470	AR VEH MNT SHOP	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
1470	AR VEH MNT SHOP	BLR-2	1	1	0	6,490	0.0	0	0	$268	2	0	0	0	$277	$0	$2,353	8.50	1.03
1470	AR VEH MNT SHOP	BLR-2	1	2	0	0	5.6	0	0	$23	0	0	0	3	$836	$0	$220	0.26	36.15
1470	AR VEH MNT SHOP	BLR-2	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
1470	AR VEH MNT SHOP	MAU-1	16	18	0	57,458	42.5	0	0	$2,548	1	0	0	1	$348	$0	$22,505	64.67	0.14
1470	AR VEH MNT SHOP	MAU-1	16	30	0	0	18.3	0	0	$75	0	1	0	3	$813	$0	$719	0.88	10.78
1470	AR VEH MNT SHOP	UH-1	21	20	0	5,130	467.8	0	0	$2,139	1	0	1	2	$1,213	$0	$20,229	16.68	0.57
1470	AR VEH MNT SHOP	UH-2	21	20	0	1,917	170.1	0	0	$780	1	0	1	2	$1,213	$0	$7,375	6.08	1.55
4010	DENTAL CLINIC	AHU-1	18	19	0	217,291	2,267.3	0	0	$18,315	2	0	0	2	$697	$0	$167,814	240.77	0.04
4010	DENTAL CLINIC	AHU-1	18	28	0	5,448	109.4	0	0	$676	1	7	0	9	$3,761	$0	$6,272	1.67	5.57
4010	DENTAL CLINIC	AHU-1	18	34	0	2,592	107.5	0	0	$550	0	1	0	0	$272	$0	$5,163	18.98	0.49
4010	DENTAL CLINIC	AHU-1	18	37	0	14,284	0.0	0	0	$590	0	0	0	2	$399	$0	$5,180	12.98	0.68
4010	DENTAL CLINIC	AHU-1	18	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
4010	DENTAL CLINIC	BLR-1	1	1	0	3,705	0.0	0	0	$153	2	0	0	0	$277	$0	$1,344	4.85	1.81
4010	DENTAL CLINIC	BLR-1	1	2	0	0	9.9	0	0	$41	0	0	0	3	$836	$0	$390	0.47	20.45
4010	DENTAL CLINIC	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
4010	DENTAL CLINIC	CH-1	6	10	3	9,746	0.0	0	0	$474	1	0	1	0	$386	$0	$4,142	10.73	0.81
4010	DENTAL CLINIC	CH-1	6	11	0	1,400	0.0	0	0	$58	0	0	0	2	$664	$0	$508	0.76	11.48
4010	DENTAL CLINIC	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
4010	DENTAL CLINIC	CH-1	6	42	67	0	0.0	0	0	$1,715	1	0	0	0	$150	$0	$14,632	97.54	0.09

NO.					SVGS PER YR	KWH SVGS. PER YR	SVGS PER YR	LABOR HOUR SVGS PER YR	MATRL $ SVGS. PER YR	COST SVGS. PER YR	PNT	PNT	PNT	PNT		PER YR			
4010	DENTAL CLINIC	HWP-1	26	24	0	3,520	0.0	3	0	$217	1	0	1	0	$386	$0	$1,890	4.90	1.78
4010	DENTAL CLINIC	HWP-2	26	24	0	3,520	0.0	3	0	$217	1	0	1	0	$386	$0	$1,890	4.90	1.78
4010	DENTAL CLINIC	RAD-1	25	23	0	3,747	0.0	3	0	$227	1	0	1	1	$570	$0	$1,973	3.46	2.51
5000	FIRE STATION	AHU-1	10	18	0	0	47.7	0	0	$197	1	0	0	1	$348	$0	$1,875	5.39	1.77
5000	FIRE STATION	AHU-1	10	29	0	4,986	111.4	0	0	$665	0	7	0	8	$3,378	$0	$6,180	1.83	5.08
5000	FIRE STATION	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
5000	FIRE STATION	AHU-2	16	18	0	0	31.8	0	0	$131	1	0	0	1	$348	$0	$1,250	3.59	2.65
5000	FIRE STATION	AHU-2	16	30	0	0	74.2	0	0	$306	0	1	0	3	$813	$0	$2,915	3.59	2.66
5000	FIRE STATION	BLR-1	1	2	0	0	4.3	0	0	$18	0	0	0	3	$836	$0	$167	0.20	47.72
5000	FIRE STATION	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
5000	FIRE STATION	CH-1	8	17	8	175	0.0	3	0	$294	1	0	1	0	$243	$0	$2,507	10.32	0.83
5302	POST OFFICE	AHU-1	10	18	0	116,767	311.5	0	0	$6,106	1	0	0	1	$348	$0	$54,571	156.81	0.06
5302	POST OFFICE	AHU-1	10	29	0	6,921	39.8	0	0	$450	0	7	0	8	$3,378	$0	$4,073	1.21	7.51
5302	POST OFFICE	AHU-1	10	33	0	198	12.5	0	0	$60	0	1	0	0	$272	$0	$563	2.07	4.55
5302	POST OFFICE	AHU-1	10	35	0	2,362	0.0	0	0	$98	0	0	0	2	$399	$0	$856	2.15	4.09
5302	POST OFFICE	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
5302	POST OFFICE	BLR-1	1	1	0	3,658	0.0	0	0	$151	2	0	0	0	$277	$0	$1,326	4.79	1.83
5302	POST OFFICE	BLR-1	1	2	0	0	3.4	0	0	$14	0	0	0	3	$836	$0	$135	0.16	58.82
5302	POST OFFICE	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
5302	POST OFFICE	CH-1	8	17	45	945	0.0	3	0	$1,269	1	0	1	0	$243	$0	$10,833	44.58	0.19
5302	POST OFFICE	RAD-1	25	23	0	3,658	0.0	3	0	$223	1	0	1	1	$570	$0	$1,940	3.40	2.56
5309	GUEST HOUSE	BLR-1	1	2	0	0	7.1	0	0	$29	0	0	0	3	$836	$0	$279	0.33	28.52
5309	GUEST HOUSE	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
5309	GUEST HOUSE	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
5309	GUEST HOUSE	CH-1	6	10	3	0	0.0	0	0	$71	1	0	1	0	$386	$0	$608	1.58	5.42
5309	GUEST HOUSE	CH-1	6	11	0	875	0.0	0	0	$36	0	0	0	2	$664	$0	$317	0.48	18.37
5309	GUEST HOUSE	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
5309	GUEST HOUSE	CH-1	6	42	42	0	0.0	0	0	$1,072	1	0	0	0	$150	$0	$9,145	60.97	0.14
5309	GUEST HOUSE	HWP-1	26	24	0	0	0.0	3	0	$72	1	0	1	0	$386	$0	$614	1.59	5.36
5315	MORRIS HILL CHAPEL	AHU-1	15	18	14	49,177	465.6	0	0	$4,311	1	0	0	1	$348	$0	$39,199	112.64	0.08
5315	MORRIS HILL CHAPEL	AHU-1	15	27	0	34,238	144.5	0	0	$2,009	0	2	0	3	$1,097	$0	$18,088	16.49	0.55
5315	MORRIS HILL CHAPEL	AHU-1	15	33	0	285	13.8	0	0	$69	0	1	0	0	$272	$0	$647	2.38	3.96
5315	MORRIS HILL CHAPEL	AHU-1	15	36	0	7,070	0.0	0	0	$292	0	0	0	2	$399	$0	$2,564	6.42	1.37
5315	MORRIS HILL CHAPEL	BLR-1	1	1	0	17,719	0.0	0	0	$732	2	0	0	0	$277	$0	$6,425	23.20	0.38
5315	MORRIS HILL CHAPEL	BLR-1	1	2	0	0	9.9	0	0	$41	0	0	0	3	$836	$0	$388	0.46	20.53
5315	MORRIS HILL CHAPEL	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
5315	MORRIS HILL CHAPEL	CH-1	6	10	3	7,332	0.0	0	0	$374	1	0	1	0	$386	$0	$3,267	8.46	1.03
5315	MORRIS HILL CHAPEL	CH-1	6	11	0	1,068	0.0	0	0	$44	0	0	0	2	$664	$0	$387	0.58	15.06
5315	MORRIS HILL CHAPEL	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
5315	MORRIS HILL CHAPEL	CH-1	6	42	51	0	0.0	0	0	$1,308	1	0	0	0	$150	$0	$11,157	74.38	0.11
5315	MORRIS HILL CHAPEL	CH-2	6	10	3	7,332	0.0	0	0	$374	1	0	1	0	$386	$0	$3,267	8.46	1.03

5315	MORRIS HILL CHAPEL	CH-2	6	11	0	1,068	0.0	0	0	$44	0	0	0	2	$664	$0	$387	0.58	15.06
5315	MORRIS HILL CHAPEL	CH-2	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
5315	MORRIS HILL CHAPEL	CH-2	6	42	51	0	0.0	0	0	$1,308	1	0	0	0	$150	$0	$11,157	74.38	0.11
5315	MORRIS HILL CHAPEL	CH-3	6	10	1	2,426	0.0	0	0	$124	1	0	1	0	$386	$0	$1,081	2.80	3.12
5315	MORRIS HILL CHAPEL	CH-3	6	11	0	184	0.0	0	0	$8	0	0	0	2	$664	$0	$67	0.10	87.50
5315	MORRIS HILL CHAPEL	CH-3	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
5315	MORRIS HILL CHAPEL	CH-3	6	42	9	0	0.0	0	0	$225	1	0	0	0	$150	$0	$1,920	12.80	0.67
5315	MORRIS HILL CHAPEL	FC-1	19	20	0	9,702	14.1	0	0	$459	1	0	1	2	$1,213	$0	$4,073	3.36	2.64
5315	MORRIS HILL CHAPEL	FC-2	19	20	0	10,326	17.0	0	0	$496	1	0	1	2	$1,213	$0	$4,410	3.64	2.44
5315	MORRIS HILL CHAPEL	FC-3	19	20	0	6,816	11.3	0	0	$328	1	0	1	2	$1,213	$0	$2,916	2.40	3.70
5315	MORRIS HILL CHAPEL	HWP-1	26	24	0	3,659	0.0	3	0	$223	1	0	1	0	$386	$0	$1,941	5.03	1.73
5315	MORRIS HILL CHAPEL	HWP-2	26	24	0	2,052	0.0	3	0	$157	1	0	1	0	$386	$0	$1,358	3.52	2.46
5800	YOUTH CTR	AHU-1	10	18	21	104,012	796.6	0	0	$8,114	1	0	0	1	$348	$0	$73,572	211.41	0.04
5800	YOUTH CTR	AHU-1	10	29	0	578	17.0	0	0	$94	0	7	0	8	$3,378	$0	$876	0.26	36.01
5800	YOUTH CTR	AHU-1	10	33	0	80	7.8	0	0	$36	0	1	0	0	$272	$0	$337	1.24	7.64
5800	YOUTH CTR	AHU-1	10	35	0	335	0.0	0	0	$14	0	0	0	2	$399	$0	$122	0.30	28.81
5800	YOUTH CTR	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
5800	YOUTH CTR	AHU-2	15	18	11	60,506	574.9	0	0	$5,147	1	0	0	1	$348	$0	$46,901	134.77	0.07
5800	YOUTH CTR	AHU-2	15	27	0	377	11.3	0	0	$62	0	2	0	3	$1,097	$0	$581	0.53	17.64
5800	YOUTH CTR	AHU-2	15	33	0	78	7.7	0	0	$35	0	1	0	0	$272	$0	$329	1.21	7.81
5800	YOUTH CTR	AHU-2	15	36	0	219	0.0	0	0	$9	0	0	0	2	$399	$0	$79	0.20	44.18
5800	YOUTH CTR	BLR-1	1	1	0	6,685	0.0	0	0	$276	2	0	0	0	$277	$0	$2,424	8.75	1.00
5800	YOUTH CTR	BLR-1	1	2	0	0	3.4	0	0	$14	0	0	0	3	$836	$0	$134	0.16	59.65
5800	YOUTH CTR	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
5800	YOUTH CTR	BLR-2	1	1	0	581	0.0	0	0	$24	2	0	0	0	$277	$0	$211	0.76	11.54
5800	YOUTH CTR	BLR-2	1	2	0	0	3.4	0	0	$14	0	0	0	3	$836	$0	$134	0.16	59.65
5800	YOUTH CTR	BLR-2	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
5800	YOUTH CTR	CH-1	6	10	2	5,451	0.0	0	0	$269	1	0	1	0	$386	$0	$2,353	6.10	1.43
5800	YOUTH CTR	CH-1	6	11	0	940	0.0	0	0	$39	0	0	0	2	$664	$0	$341	0.51	17.11
5800	YOUTH CTR	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
5800	YOUTH CTR	CH-1	6	42	45	0	0.0	0	0	$1,151	1	0	0	0	$150	$0	$9,821	65.48	0.13
5800	YOUTH CTR	HWP-1	26	24	0	5,608	0.0	3	0	$304	1	0	1	0	$386	$0	$2,648	6.86	1.27
5800	YOUTH CTR	HWP-2	26	24	0	5,608	0.0	3	0	$304	1	0	1	0	$386	$0	$2,648	6.86	1.27
6620	COMMUN ACT CTR	AHU-1	10	18	11	54,487	218.0	0	0	$3,428	1	0	0	1	$348	$0	$30,704	88.23	0.10
6620	COMMUN ACT CTR	AHU-1	10	29	0	2,784	45.3	0	0	$301	0	7	0	8	$3,378	$0	$2,786	0.82	11.21
6620	COMMUN ACT CTR	AHU-1	10	33	0	0	8.3	0	0	$34	0	1	0	0	$272	$0	$326	1.20	7.95
6620	COMMUN ACT CTR	AHU-1	10	35	0	2,375	0.0	0	0	$98	0	0	0	2	$399	$0	$861	2.16	4.07
6620	COMMUN ACT CTR	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
6620	COMMUN ACT CTR	AHU-2	15	18	11	49,795	420.8	0	0	$4,070	1	0	0	1	$348	$0	$36,968	106.23	0.09
6620	COMMUN ACT CTR	AHU-2	15	27	0	2,070	32.5	0	0	$219	0	2	0	3	$1,097	$0	$2,028	1.85	5.00
6620	COMMUN ACT CTR	AHU-2	15	33	0	0	18.5	0	0	$76	0	1	0	0	$272	$0	$728	2.68	3.56

6620	COMMUN ACT CTR	AHU-2	15	36	0	1,766	0.0	0	0	$73	0	0	0	2	$399	$0	$640	1.60	5.47
6620	COMMUN ACT CTR	AHU-3	16	18	0	15,509	1,424.1	0	0	$6,508	1	0	0	1	$348	$0	$61,538	176.83	0.05
6620	COMMUN ACT CTR	AHU-3	16	30	0	0	19.8	0	0	$82	0	1	0	3	$813	$0	$777	0.96	9.97
6620	COMMUN ACT CTR	AHU-4	15	18	7	37,042	436.0	0	0	$3,516	1	0	0	1	$348	$0	$32,172	92.45	0.10
6620	COMMUN ACT CTR	AHU-4	15	27	0	1,898	32.5	0	0	$212	0	2	0	3	$1,097	$0	$1,965	1.79	5.17
6620	COMMUN ACT CTR	AHU-4	15	33	0	0	19.3	0	0	$79	0	1	0	0	$272	$0	$756	2.78	3.43
6620	COMMUN ACT CTR	AHU-4	15	36	0	1,619	0.0	0	0	$67	0	0	0	2	$399	$0	$587	1.47	5.97
6620	COMMUN ACT CTR	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
6620	COMMUN ACT CTR	CH-1	6	10	5	16,827	0.0	0	0	$814	1	0	1	0	$386	$0	$7,114	18.43	0.47
6620	COMMUN ACT CTR	CH-1	6	11	0	2,275	0.0	0	0	$94	0	0	0	2	$664	$0	$825	1.24	7.07
6620	COMMUN ACT CTR	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
6620	COMMUN ACT CTR	CH-1	6	42	109	0	0.0	0	0	$2,787	1	0	0	0	$150	$0	$23,776	158.51	0.05
6620	COMMUN ACT CTR	CV-1	5	8	0	7,232	0.0	0	0	$299	1	0	1	0	$386	$0	$2,622	6.79	1.29
6620	COMMUN ACT CTR	CV-1	5	9	0	0	25.6	0	0	$106	0	1	0	3	$1,109	$0	$1,006	0.91	10.50
6620	COMMUN ACT CTR	CWP-1	26	24	4	14,893	0.0	3	0	$792	1	0	1	0	$386	$0	$6,910	17.90	0.49
6620	COMMUN ACT CTR	RAD-1	25	23	0	1,917	0.0	3	0	$151	1	0	1	1	$570	$0	$1,309	2.30	3.77
6910	EXC SP ST FAC	AHU-1	15	18	0	6,028	175.3	0	0	$971	1	0	0	1	$348	$0	$9,069	26.06	0.36
6910	EXC SP ST FAC	AHU-1	15	27	0	1,178	81.7	0	0	$385	0	2	0	3	$1,097	$0	$3,634	3.31	2.85
6910	EXC SP ST FAC	AHU-2	15	18	0	6,028	175.3	0	0	$971	1	0	0	1	$348	$0	$9,069	26.06	0.36
6910	EXC SP ST FAC	AHU-2	15	27	0	1,178	81.7	0	0	$385	0	2	0	3	$1,097	$0	$3,634	3.31	2.85
6910	EXC SP ST FAC	CH-1	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
6910	EXC SP ST FAC	CH-2	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
6914	EXC MAIN RETL	AHU-1	15	18	0	140,523	4,981.4	0	0	$26,327	1	0	0	1	$348	$0	$246,545	708.46	0.01
6914	EXC MAIN RETL	AHU-1	15	27	0	29,433	1,938.2	0	0	$9,201	0	2	0	3	$1,097	$0	$86,772	79.10	0.12
6914	EXC MAIN RETL	AHU-1	15	33	0	1,138	85.0	0	0	$397	0	1	0	0	$272	$0	$3,750	13.79	0.68
6914	EXC MAIN RETL	AHU-1	15	36	0	35,605	0.0	0	0	$1,470	0	0	0	2	$399	$0	$12,911	32.36	0.27
6914	EXC MAIN RETL	AHU-2	15	18	0	15,262	484.3	0	0	$2,626	1	0	0	1	$348	$0	$24,549	70.54	0.13
6914	EXC MAIN RETL	AHU-2	15	27	0	3,666	228.0	0	0	$1,091	0	2	0	3	$1,097	$0	$10,282	9.37	1.01
6914	EXC MAIN RETL	AHU-2	15	33	0	42	3.2	0	0	$15	0	1	0	0	$272	$0	$139	0.51	18.43
6914	EXC MAIN RETL	AHU-2	15	36	0	4,435	0.0	0	0	$183	0	0	0	2	$399	$0	$1,608	4.03	2.18
6914	EXC MAIN RETL	AHU-3	16	18	0	11,296	1,091.3	0	0	$4,963	1	0	0	1	$348	$0	$46,946	134.90	0.07
6914	EXC MAIN RETL	AHU-3	16	30	0	0	494.0	0	0	$2,035	0	1	0	3	$813	$0	$19,398	23.86	0.40
6914	EXC MAIN RETL	AHU-3	16	33	0	0	15.8	0	0	$65	0	1	0	0	$272	$0	$619	2.27	4.19
6914	EXC MAIN RETL	AHU-4	10	18	0	54,549	1,387.9	0	0	$7,971	1	0	0	1	$348	$0	$74,273	213.43	0.04
6914	EXC MAIN RETL	AHU-4	10	29	0	10,076	684.1	0	0	$3,234	0	7	0	8	$3,378	$0	$30,512	9.03	1.04
6914	EXC MAIN RETL	AHU-4	10	33	0	68	5.1	0	0	$24	0	1	0	0	$272	$0	$225	0.83	11.40
6914	EXC MAIN RETL	AHU-4	10	35	0	12,189	0.0	0	0	$503	0	0	0	2	$399	$0	$4,420	11.08	0.79
6914	EXC MAIN RETL	AHU-4	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
6914	EXC MAIN RETL	AHU-5	10	18	0	40,810	928.2	0	0	$5,510	1	0	0	1	$348	$0	$51,244	147.25	0.06
6914	EXC MAIN RETL	AHU-5	10	29	0	7,112	456.0	0	0	$2,173	0	7	0	8	$3,378	$0	$20,485	6.06	1.55
6914	EXC MAIN RETL	AHU-5	10	33	0	48	3.6	0	0	$17	0	1	0	0	$272	$0	$159	0.58	16.15

6914	EXC MAIN RETL	AHU-5	10	35	0	8,603	0.0	0	0	$355	0	0	0	2	$399	$0	$3,120	7.82	1.12
6914	EXC MAIN RETL	AHU-5	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
6914	EXC MAIN RETL	BLR-1	1	1	0	12,662	0.0	0	0	$523	2	0	0	0	$277	$0	$4,591	16.57	0.53
6914	EXC MAIN RETL	BLR-1	1	2	0	0	11.3	0	0	$47	0	0	0	3	$836	$0	$445	0.53	17.89
6914	EXC MAIN RETL	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
6914	EXC MAIN RETL	CH-1	7	10	4	11,015	0.0	0	0	$560	1	0	1	0	$386	$0	$4,890	12.67	0.69
6914	EXC MAIN RETL	CH-1	7	12	0	2,223	0.0	0	0	$92	0	0	0	4	$1,133	$0	$806	0.71	12.34
6914	EXC MAIN RETL	CH-1	7	16	0	0	0.0	6	0	$144	0	0	2	0	$281	$0	$1,228	4.37	1.95
6914	EXC MAIN RETL	CH-1	7	43	107	0	0.0	0	0	$2,723	5	0	0	0	$530	$0	$23,228	43.83	0.19
6914	EXC MAIN RETL	CH-2	7	10	4	11,015	0.0	0	0	$560	1	0	1	0	$386	$0	$4,890	12.67	0.69
6914	EXC MAIN RETL	CH-2	7	12	0	2,223	0.0	0	0	$92	0	0	0	4	$1,133	$0	$806	0.71	12.34
6914	EXC MAIN RETL	CH-2	7	16	0	0	0.0	6	0	$144	0	0	2	0	$281	$0	$1,228	4.37	1.95
6914	EXC MAIN RETL	CH-2	7	43	107	0	0.0	0	0	$2,723	5	0	0	0	$530	$0	$23,228	43.83	0.19
6914	EXC MAIN RETL	HWP-1	26	24	0	11,296	0.0	3	0	$539	1	0	1	0	$386	$0	$4,710	12.20	0.72
6918	SKILL DEV CTR	AHU-1	15	18	0	16,077	129.2	0	0	$1,196	1	0	0	1	$348	$0	$10,902	31.33	0.29
6918	SKILL DEV CTR	AHU-1	15	27	0	843	21.0	0	0	$121	0	2	0	3	$1,097	$0	$1,129	1.03	9.05
6918	SKILL DEV CTR	AHU-1	15	33	0	0	5.1	0	0	$21	0	1	0	0	$272	$0	$202	0.74	12.82
6918	SKILL DEV CTR	AHU-1	15	36	0	719	0.0	0	0	$30	0	0	0	2	$399	$0	$261	0.65	13.43
6918	SKILL DEV CTR	AHU-2	15	18	0	5,062	35.1	0	0	$354	1	0	0	1	$348	$0	$3,215	9.24	0.98
6918	SKILL DEV CTR	AHU-2	15	27	0	295	6.8	0	0	$40	0	2	0	3	$1,097	$0	$373	0.34	27.34
6918	SKILL DEV CTR	AHU-2	15	33	0	0	1.4	0	0	$6	0	1	0	0	$272	$0	$53	0.20	48.85
6918	SKILL DEV CTR	AHU-2	15	36	0	252	0.0	0	0	$10	0	0	0	2	$399	$0	$91	0.23	38.36
6918	SKILL DEV CTR	AHU-3	15	18	0	5,062	35.1	0	0	$354	1	0	0	1	$348	$0	$3,215	9.24	0.98
6918	SKILL DEV CTR	AHU-3	15	27	0	295	6.8	0	0	$40	0	2	0	3	$1,097	$0	$373	0.34	27.34
6918	SKILL DEV CTR	AHU-3	15	33	0	0	1.4	0	0	$6	0	1	0	0	$272	$0	$53	0.20	48.85
6918	SKILL DEV CTR	AHU-3	15	36	0	252	0.0	0	0	$10	0	0	0	2	$399	$0	$91	0.23	38.36
6918	SKILL DEV CTR	MUA-1	16	18	0	5,169	404.7	0	0	$1,881	1	0	0	1	$348	$0	$17,766	51.05	0.19
6918	SKILL DEV CTR	RTU-1	15	18	0	21,060	103.1	0	0	$1,294	1	0	0	1	$348	$0	$11,684	33.57	0.27
6918	SKILL DEV CTR	RTU-1	15	27	0	843	22.2	0	0	$126	0	2	0	3	$1,097	$0	$1,177	1.07	8.69
6918	SKILL DEV CTR	RTU-1	15	33	0	0	3.9	0	0	$16	0	1	0	0	$272	$0	$152	0.56	17.10
6918	SKILL DEV CTR	RTU-1	15	36	0	719	0.0	0	0	$30	0	0	0	2	$399	$0	$261	0.65	13.43
6918	SKILL DEV CTR	RTU-2	15	18	0	8,866	53.4	0	0	$586	1	0	0	1	$348	$0	$5,313	15.27	0.59
6918	SKILL DEV CTR	RTU-2	15	27	0	405	14.8	0	0	$78	0	2	0	3	$1,097	$0	$728	0.66	14.13
6918	SKILL DEV CTR	RTU-2	15	33	0	0	1.9	0	0	$8	0	1	0	0	$272	$0	$73	0.27	35.62
6918	SKILL DEV CTR	RTU-2	15	36	0	345	0.0	0	0	$14	0	0	0	2	$399	$0	$125	0.31	27.97
6918	SKILL DEV CTR	RTU-3	15	18	0	8,866	53.4	0	0	$586	1	0	0	1	$348	$0	$5,313	15.27	0.59
6918	SKILL DEV CTR	RTU-3	15	27	0	405	14.8	0	0	$78	0	2	0	3	$1,097	$0	$728	0.66	14.13
6918	SKILL DEV CTR	RTU-3	15	33	0	0	1.9	0	0	$8	0	1	0	0	$272	$0	$73	0.27	35.62
6918	SKILL DEV CTR	RTU-3	15	36	0	345	0.0	0	0	$14	0	0	0	2	$399	$0	$125	0.31	27.97
6918	SKILL DEV CTR	RTU-4	15	18	0	8,866	53.4	0	0	$586	1	0	0	1	$348	$0	$5,313	15.27	0.59
6918	SKILL DEV CTR	RTU-4	15	27	0	405	14.8	0	0	$78	0	2	0	3	$1,097	$0	$728	0.66	14.13

BLDG NO.	BLDG NAME	EQUIP TAG	SYSTEM TYPE	FUNCTN NUMBER	KW SVGS. PER YR	KWH SVGS. PER YR	MBTU SVGS. PER YR	LABOR HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL CONSTR COST	RECUR COSTS PER YR	TOTAL DISC SAVINGS	SIR	PAYBACK
6918	SKILL DEV CTR	RTU-4	15	33	0	0	1.9	0	0	$8	0	1	0	0	$272	$0	$73	0.27	35.62
6918	SKILL DEV CTR	RTU-4	15	36	0	345	0.0	0	0	$14	0	0	0	2	$399	$0	$125	0.31	27.97
6918	SKILL DEV CTR	RTU-5	15	18	0	21,060	103.1	0	0	$1,294	1	0	0	1	$348	$0	$11,684	33.57	0.27
6918	SKILL DEV CTR	RTU-5	15	27	0	843	22.2	0	0	$126	0	2	0	3	$1,097	$0	$1,177	1.07	8.69
6918	SKILL DEV CTR	RTU-5	15	33	0	0	3.9	0	0	$16	0	1	0	0	$272	$0	$152	0.56	17.10
6918	SKILL DEV CTR	RTU-5	15	36	0	719	0.0	0	0	$30	0	0	0	2	$399	$0	$261	0.65	13.43
6940	INDOOR SWIM POOL	BLR-1	1	1	0	6,161	0.0	0	0	$254	2	0	0	0	$277	$0	$2,234	8.07	1.09
6940	INDOOR SWIM POOL	BLR-1	1	2	0	0	15.9	0	0	$65	0	0	0	3	$836	$0	$623	0.75	12.78
6940	INDOOR SWIM POOL	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
6940	INDOOR SWIM POOL	HRU-1	17	19	0	75,684	61.1	0	0	$3,378	2	0	0	2	$697	$0	$29,843	42.82	0.21
6940	INDOOR SWIM POOL	HRU-1	17	30	0	0	24.1	0	0	$99	0	1	0	3	$813	$0	$945	1.16	8.20
6940	INDOOR SWIM POOL	HV-2	16	18	0	13,402	1,087.1	0	0	$5,033	1	0	0	1	$348	$0	$47,545	136.62	0.07
6940	INDOOR SWIM POOL	HV-2	16	30	0	0	7.7	0	0	$32	0	1	0	3	$813	$0	$302	0.37	25.68
6940	INDOOR SWIM POOL	HWP-1	26	24	0	3,161	0.0	3	0	$203	1	0	1	0	$386	$0	$1,760	4.56	1.91
7017	BN HQ BLDG	ACCU-1	8	17	7	140	0.0	3	0	$249	1	0	1	0	$243	$0	$2,128	8.76	0.97
7017	BN HQ BLDG	AHU-1	15	18	2	23,518	116.7	0	0	$1,497	1	0	0	1	$348	$0	$13,491	38.77	0.23
7017	BN HQ BLDG	AHU-1	15	27	0	2,369	35.0	0	0	$242	0	2	0	3	$1,097	$0	$2,232	2.03	4.53
7024	GYMNASIUM	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7024	GYMNASIUM	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7024	GYMNASIUM	FC-1	16	18	0	296	155.1	0	0	$651	1	0	0	1	$348	$0	$6,197	17.81	0.53
7024	GYMNASIUM	FC-1	16	30	0	0	1.5	0	0	$6	0	1	0	3	$813	$0	$58	0.07	133.77
7024	GYMNASIUM	FC-2	16	18	0	296	155.1	0	0	$651	1	0	0	1	$348	$0	$6,197	17.81	0.53
7024	GYMNASIUM	FC-2	16	30	0	0	1.5	0	0	$6	0	1	0	3	$813	$0	$58	0.07	133.77
7024	GYMNASIUM	HV-1	16	18	0	3,195	856.6	0	0	$3,661	1	0	0	1	$348	$0	$34,793	99.98	0.10
7024	GYMNASIUM	HV-1	16	30	0	0	5.3	0	0	$22	0	1	0	3	$813	$0	$209	0.26	37.16
7024	GYMNASIUM	HV-2	16	18	0	3,195	856.6	0	0	$3,661	1	0	0	1	$348	$0	$34,793	99.98	0.10
7024	GYMNASIUM	HV-2	16	30	0	0	5.3	0	0	$22	0	1	0	3	$813	$0	$209	0.26	37.16
7024	GYMNASIUM	HV-3	16	18	0	3,195	856.6	0	0	$3,661	1	0	0	1	$348	$0	$34,793	99.98	0.10
7024	GYMNASIUM	HV-3	16	30	0	0	5.3	0	0	$22	0	1	0	3	$813	$0	$209	0.26	37.16
7024	GYMNASIUM	HV-4	16	18	0	3,195	856.6	0	0	$3,661	1	0	0	1	$348	$0	$34,793	99.98	0.10
7024	GYMNASIUM	HV-4	16	30	0	0	5.3	0	0	$22	0	1	0	3	$813	$0	$209	0.26	37.16
7024	GYMNASIUM	HV-5	16	18	0	3,195	856.6	0	0	$3,661	1	0	0	1	$348	$0	$34,793	99.98	0.10
7024	GYMNASIUM	HV-5	16	30	0	0	5.3	0	0	$22	0	1	0	3	$813	$0	$209	0.26	37.16
7028	BN CLASSROOMS	BLR-1	1	1	0	537	0.0	0	0	$22	2	0	0	0	$277	$0	$195	0.70	12.48
7028	BN CLASSROOMS	BLR-1	1	2	0	0	3.7	0	0	$15	0	0	0	3	$836	$0	$147	0.18	54.31
7028	BN CLASSROOMS	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7028	BN CLASSROOMS	DTWP-1	24	22	2	6,866	0.0	3	0	$418	1	0	1	4	$1,418	$0	$3,640	2.57	3.39
7028	BN CLASSROOMS	FC-1	19	20	0	27,132	63.1	0	0	$1,380	1	0	1	2	$1,213	$0	$12,314	10.15	0.88
7031	BN HQ BLDG	BLR-1	1	2	0	0	3.0	0	0	$12	0	0	0	3	$836	$0	$118	0.14	67.78
7031	BN HQ BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7031	BN HQ BLDG	DTWP-1	24	22	1	3,849	0.0	3	0	$266	1	0	1	4	$1,418	$0	$2,311	1.63	5.33

7031	BN HQ BLDG	FC-1	19	20	0	27,132	63.1	0	0	$1,380	1	0	1	2	$1,213	$0	$12,314	10.15	0.88
7033	BN HQ BLDG	AHU-1	15	18	3	34,878	134.7	0	0	$2,075	1	0	0	1	$348	$0	$18,616	53.49	0.17
7033	BN HQ BLDG	AHU-1	15	27	0	2,940	59.0	0	0	$364	0	2	0	3	$1,097	$0	$3,383	3.08	3.01
7033	BN HQ BLDG	AHU-1	15	33	0	52	3.3	0	0	$16	0	1	0	0	$272	$0	$147	0.54	17.47
7033	BN HQ BLDG	AHU-1	15	36	0	1,003	0.0	0	0	$41	0	0	0	2	$399	$0	$364	0.91	9.63
7033	BN HQ BLDG	BLR-1	1	1	0	1,170	0.0	0	0	$48	2	0	0	0	$277	$0	$424	1.53	5.73
7033	BN HQ BLDG	BLR-1	1	2	0	0	1.7	0	0	$7	0	0	0	3	$836	$0	$67	0.08	119.69
7033	BN HQ BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7034	CLINIC W/O BEDS	AHU-1	10	18	0	32,428	287.2	0	0	$2,523	1	0	0	1	$348	$0	$23,036	66.20	0.14
7034	CLINIC W/O BEDS	AHU-1	10	29	0	1,154	64.3	0	0	$312	0	7	0	8	$3,378	$0	$2,942	0.87	10.81
7034	CLINIC W/O BEDS	AHU-1	10	33	0	275	11.4	0	0	$58	0	1	0	0	$272	$0	$547	2.01	4.67
7034	CLINIC W/O BEDS	AHU-1	10	35	0	3,026	0.0	0	0	$125	0	0	0	2	$399	$0	$1,097	2.75	3.19
7034	CLINIC W/O BEDS	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7034	CLINIC W/O BEDS	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7036	REGIMENTAL HQ BLDG	AHU-1	15	18	2	15,897	26.7	0	0	$829	1	0	0	1	$348	$0	$7,349	21.12	0.42
7036	REGIMENTAL HQ BLDG	AHU-1	15	27	0	1,411	22.0	0	0	$149	0	2	0	3	$1,097	$0	$1,374	1.25	7.38
7036	REGIMENTAL HQ BLDG	AHU-1	15	36	0	482	0.0	0	0	$20	0	0	0	2	$399	$0	$175	0.44	20.06
7036	REGIMENTAL HQ BLDG	BLR-1	1	1	0	2,442	0.0	0	0	$101	2	0	0	0	$277	$0	$886	3.20	2.75
7036	REGIMENTAL HQ BLDG	BLR-1	1	2	0	0	4.9	0	0	$20	0	0	0	3	$836	$0	$192	0.23	41.42
7036	REGIMENTAL HQ BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7036	REGIMENTAL HQ BLDG	FC-1	19	20	0	13,396	10.2	0	0	$595	1	0	1	2	$1,213	$0	$5,259	4.34	2.04
7036	REGIMENTAL HQ BLDG	FC-2	19	20	0	13,396	10.2	0	0	$595	1	0	1	2	$1,213	$0	$5,259	4.34	2.04
7046	BN CLASSROOMS	BLR-1	1	1	0	269	0.0	0	0	$11	2	0	0	0	$277	$0	$97	0.35	24.97
7046	BN CLASSROOMS	BLR-1	1	2	0	0	3.0	0	0	$12	0	0	0	3	$836	$0	$118	0.14	67.78
7046	BN CLASSROOMS	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7046	BN CLASSROOMS	DTWP-1	24	22	2	6,866	0.0	3	0	$418	1	0	1	4	$1,418	$0	$3,640	2.57	3.39
7046	BN CLASSROOMS	FC-1	19	20	0	23,190	63.1	0	0	$1,218	1	0	1	2	$1,213	$0	$10,885	8.97	1.00
7047	BN HQ BLDG	BLR-1	1	2	0	0	3.0	0	0	$12	0	0	0	3	$836	$0	$118	0.14	67.78
7047	BN HQ BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7047	BN HQ BLDG	DTWP-1	24	22	1	2,802	0.0	3	0	$211	1	0	1	4	$1,418	$0	$1,831	1.29	6.71
7047	BN HQ BLDG	FC-1	19	20	0	25,436	63.1	0	0	$1,310	1	0	1	2	$1,213	$0	$11,699	9.65	0.93
7048	BN HQ BLDG	BLR-1	1	2	0	0	1.9	0	0	$8	0	0	0	3	$836	$0	$73	0.09	108.45
7048	BN HQ BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7048	BN HQ BLDG	DTWP-1	24	22	1	4,026	0.0	3	0	$274	1	0	1	4	$1,418	$0	$2,375	1.67	5.18
7048	BN HQ BLDG	FC-1	19	20	0	22,786	44.0	0	0	$1,122	1	0	1	2	$1,213	$0	$9,990	8.24	1.08
7050	ENL BARRACKS W/AS	AHU-1	15	18	14	13,420	8.4	0	0	$951	1	0	0	1	$348	$0	$8,281	23.80	0.37
7050	ENL BARRACKS W/AS	AHU-1	15	27	0	2,784	14.3	0	0	$174	0	2	0	3	$1,097	$0	$1,571	1.43	6.31
7050	ENL BARRACKS W/AS	BLR-1	1	2	0	0	12.4	0	0	$51	0	0	0	3	$836	$0	$487	0.58	16.37
7050	ENL BARRACKS W/AS	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7050	ENL BARRACKS W/AS	BLR-2	1	2	0	0	12.4	0	0	$51	0	0	0	3	$836	$0	$487	0.58	16.37
7050	ENL BARRACKS W/AS	BLR-2	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44

7050	ENL BARRACKS W/AS	BLR-3	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7050	ENL BARRACKS W/AS	BLR-4	1	2	0	0	6.8	0	0	$28	0	0	0	3	$836	$0	$267	0.32	29.82
7050	ENL BARRACKS W/AS	BLR-4	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7050	ENL BARRACKS W/AS	CV-1	5	9	0	0	5.1	0	0	$21	0	1	0	3	$1,109	$0	$200	0.18	52.75
7050	ENL BARRACKS W/AS	DTWP-1	24	22	3	0	0.0	3	0	$159	1	0	1	4	$1,418	$0	$1,360	0.96	8.90
7050	ENL BARRACKS W/AS	DTWP-2	24	22	3	0	0.0	3	0	$152	1	0	1	4	$1,418	$0	$1,293	0.91	9.36
7050	ENL BARRACKS W/AS	HV-1	16	18	0	2,683	7.0	0	0	$140	1	0	0	1	$348	$0	$1,249	3.59	2.49
7050	ENL BARRACKS W/AS	HV-1	16	30	0	0	11.9	0	0	$49	0	1	0	3	$813	$0	$468	0.58	16.57
7050	ENL BARRACKS W/AS	RAD-1	25	23	0	0	0.0	3	0	$72	1	0	1	1	$570	$0	$614	1.08	7.92
7053	ENL BARRACKS W/AS	BLR-1	1	2	0	0	12.4	0	0	$51	0	0	0	3	$836	$0	$487	0.58	16.37
7053	ENL BARRACKS W/AS	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7053	ENL BARRACKS W/AS	BLR-2	1	2	0	0	12.4	0	0	$51	0	0	0	3	$836	$0	$487	0.58	16.37
7053	ENL BARRACKS W/AS	BLR-2	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7053	ENL BARRACKS W/AS	BLR-3	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7053	ENL BARRACKS W/AS	DTWP-1	24	22	3	0	0.0	3	0	$159	1	0	1	4	$1,418	$0	$1,360	0.96	8.90
7053	ENL BARRACKS W/AS	DTWP-2	24	22	3	0	0.0	3	0	$152	1	0	1	4	$1,418	$0	$1,293	0.91	9.36
7053	ENL BARRACKS W/AS	RAD-1	25	23	0	0	0.0	3	0	$72	1	0	1	1	$570	$0	$614	1.08	7.92
7086	UNIT CHAPEL	AHU-1	15	18	5	33,376	422.2	0	0	$3,236	1	0	0	1	$348	$0	$29,686	85.30	0.11
7086	UNIT CHAPEL	AHU-1	15	27	0	1,320	106.6	0	0	$494	0	2	0	3	$1,097	$0	$4,663	4.25	2.22
7086	UNIT CHAPEL	AHU-1	15	33	0	171	8.3	0	0	$41	0	1	0	0	$272	$0	$388	1.43	6.59
7086	UNIT CHAPEL	AHU-1	15	36	0	273	0.0	0	0	$11	0	0	0	2	$399	$0	$99	0.25	35.45
7086	UNIT CHAPEL	BLR-1	1	2	0	0	7.4	0	0	$31	0	0	0	3	$836	$0	$291	0.35	27.36
7086	UNIT CHAPEL	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7086	UNIT CHAPEL	CH-1	8	17	17	350	0.0	3	0	$515	1	0	1	0	$243	$0	$4,399	18.10	0.47
7086	UNIT CHAPEL	CH-2	8	17	8	175	0.0	3	0	$294	1	0	1	0	$243	$0	$2,507	10.32	0.83
7086	UNIT CHAPEL	DTWP-1	24	22	3	8,514	0.0	3	0	$491	1	0	1	4	$1,418	$0	$4,277	3.02	2.89
7086	UNIT CHAPEL	DTWP-2	24	22	1	4,450	0.0	3	0	$291	1	0	1	4	$1,418	$0	$2,529	1.78	4.87
7086	UNIT CHAPEL	FC-1	19	20	0	8,084	10.3	0	0	$376	1	0	1	2	$1,213	$0	$3,335	2.75	3.22
7108	BN ADMIN & CLRM	AHU-1	10	18	11	81,297	187.2	0	0	$4,409	1	0	0	1	$348	$0	$39,216	112.69	0.08
7108	BN ADMIN & CLRM	AHU-1	10	29	0	4,750	89.8	0	0	$566	0	7	0	8	$3,378	$0	$5,249	1.55	5.97
7108	BN ADMIN & CLRM	AHU-1	10	33	0	61	3.9	0	0	$18	0	1	0	0	$272	$0	$174	0.64	14.74
7108	BN ADMIN & CLRM	AHU-1	10	35	0	1,621	0.0	0	0	$67	0	0	0	2	$399	$0	$588	1.47	5.96
7108	BN ADMIN & CLRM	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7108	BN ADMIN & CLRM	CWP-1	26	24	1	2,298	0.0	3	0	$184	1	0	1	0	$386	$0	$1,591	4.12	2.10
7108	BN ADMIN & CLRM	HWP-1	26	24	0	7,039	0.0	3	0	$363	1	0	1	0	$386	$0	$3,167	8.20	1.06
7109	BN ADMIN & CLRM	AHU-1	11	18	14	131,113	118.0	0	0	$6,263	1	0	0	1	$348	$0	$55,261	158.79	0.06
7109	BN ADMIN & CLRM	AHU-1	11	32	0	12,356	97.0	0	0	$910	0	3	0	11	$5,893	$0	$8,291	1.41	6.48
7109	BN ADMIN & CLRM	AHU-1	11	36	0	4,216	0.0	0	0	$174	0	0	0	2	$399	$0	$1,529	3.83	2.29
7109	BN ADMIN & CLRM	AHU-1	11	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7109	BN ADMIN & CLRM	BLR-1	1	1	0	6,667	0.0	0	0	$275	2	0	0	0	$277	$0	$2,418	8.73	1.01
7109	BN ADMIN & CLRM	BLR-1	1	2	0	0	19.5	0	0	$80	0	0	0	3	$836	$0	$765	0.92	10.41

							SVGS PER YR	SVGS PER YR	LABOR HOUR SVGS PER YR	MATRL SAVGS PER YR	COST SVGS PER YR	PNT	PNT	PNT	PNT	CONSTR COST				
7109	BN ADMIN & CLRM	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7109	BN ADMIN & CLRM	CH-1	6	10	1	4,285	0.0	0	0	$211	1	0	1	0	$386	$0	$1,843	4.77	1.83
7109	BN ADMIN & CLRM	CH-1	6	11	0	1,400	0.0	0	0	$58	0	0	0	2	$664	$0	$508	0.76	11.48
7109	BN ADMIN & CLRM	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7109	BN ADMIN & CLRM	CH-1	6	42	67	0	0.0	0	0	$1,715	1	0	0	0	$150	$0	$14,632	97.54	0.09
7109	BN ADMIN & CLRM	CWP-1	26	24	4	13,277	0.0	3	0	$725	1	0	1	0	$386	$0	$6,324	16.38	0.53
7109	BN ADMIN & CLRM	CWP-2	26	24	4	13,277	0.0	3	0	$725	1	0	1	0	$386	$0	$6,324	16.38	0.53
7109	BN ADMIN & CLRM	HWP-1	26	24	0	6,487	0.0	3	0	$340	1	0	1	0	$386	$0	$2,967	7.69	1.14
7176	MOTOR POOL MNT SHOP	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7176	MOTOR POOL MNT SHOP	UH-1	21	20	0	2,048	42.2	0	0	$258	1	0	1	2	$1,213	$0	$2,398	1.98	4.70
7178	MOTOR POOL ADMIN	UH-1	21	20	0	338	3.5	0	0	$28	1	0	1	2	$1,213	$0	$261	0.21	42.66
7178	MOTOR POOL ADMIN	UH-2	21	20	0	338	3.5	0	0	$28	1	0	1	2	$1,213	$0	$261	0.21	42.66
7212	CO HQ BLDG	CWP-1	26	24	2	5,360	0.0	3	0	$338	1	0	1	0	$386	$0	$2,935	7.60	1.14
7212	CO HQ BLDG	FC-1	19	20	0	13,634	251.7	0	0	$1,600	1	0	1	2	$1,213	$0	$14,825	12.22	0.76
7212	CO HQ BLDG	HV-1	16	18	0	1,628	107.5	0	0	$510	1	0	0	1	$348	$0	$4,810	13.82	0.68
7212	CO HQ BLDG	HV-1	16	30	0	0	34.5	0	0	$142	0	1	0	3	$813	$0	$1,355	1.67	5.72
7212	CO HQ BLDG	HV-2	16	18	0	1,368	107.5	0	0	$499	1	0	0	1	$348	$0	$4,716	13.55	0.70
7212	CO HQ BLDG	HV-2	16	30	0	0	34.5	0	0	$142	0	1	0	3	$813	$0	$1,355	1.67	5.72
7212	CO HQ BLDG	HV-3	16	18	0	1,628	107.5	0	0	$510	1	0	0	1	$348	$0	$4,810	13.82	0.68
7212	CO HQ BLDG	HV-3	16	30	0	0	34.5	0	0	$142	0	1	0	3	$813	$0	$1,355	1.67	5.72
7212	CO HQ BLDG	HV-4	16	18	0	1,628	107.5	0	0	$510	1	0	0	1	$348	$0	$4,810	13.82	0.68
7212	CO HQ BLDG	HV-4	16	30	0	0	34.5	0	0	$142	0	1	0	3	$813	$0	$1,355	1.67	5.72
7212	CO HQ BLDG	HWP-1	26	24	0	13,168	0.0	3	0	$616	1	0	1	0	$386	$0	$5,389	13.96	0.63
7215	BN HQ BLDG	AHU-1	15	18	1	20,501	0.0	0	0	$864	1	0	0	1	$348	$0	$7,577	21.77	0.40
7215	BN HQ BLDG	AHU-1	15	27	0	2,202	0.0	0	0	$91	0	2	0	3	$1,097	$0	$799	0.73	12.06
7215	BN HQ BLDG	BLR-1	1	2	0	0	1.5	0	0	$6	0	0	0	3	$836	$0	$57	0.07	138.71
7215	BN HQ BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7215	BN HQ BLDG	CH-1	8	17	7	140	0.0	3	0	$249	1	0	1	0	$243	$0	$2,128	8.76	0.97
7215	BN HQ BLDG	RAD-1	25	23	0	293	0.0	3	0	$84	1	0	1	1	$570	$0	$720	1.26	6.78
7218	BN HQ BLDG	AHU-1	10	18	11	85,317	231.9	0	0	$4,759	1	0	0	1	$348	$0	$42,432	121.93	0.07
7218	BN HQ BLDG	AHU-1	10	29	0	4,275	90.5	0	0	$549	0	7	0	8	$3,378	$0	$5,104	1.51	6.15
7218	BN HQ BLDG	AHU-1	10	33	0	92	5.8	0	0	$28	0	1	0	0	$272	$0	$261	0.96	9.83
7218	BN HQ BLDG	AHU-1	10	35	0	1,459	0.0	0	0	$60	0	0	0	2	$399	$0	$529	1.33	6.62
7218	BN HQ BLDG	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7218	BN HQ BLDG	BLR-1	1	1	0	3,835	0.0	0	0	$158	2	0	0	0	$277	$0	$1,391	5.02	1.75
7218	BN HQ BLDG	BLR-1	1	2	0	0	3.0	0	0	$12	0	0	0	3	$836	$0	$117	0.14	68.17
7218	BN HQ BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7218	BN HQ BLDG	CH-1	6	10	1	2,385	0.0	0	0	$115	1	0	1	0	$386	$0	$1,008	2.61	3.35
7218	BN HQ BLDG	CH-1	6	11	0	525	0.0	0	0	$22	0	0	0	2	$664	$0	$190	0.29	30.62
7218	BN HQ BLDG	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7218	BN HQ BLDG	CH-1	6	42	25	0	0.0	0	0	$643	1	0	0	0	$150	$0	$5,487	36.58	0.23

7220	CO HQ BLDG	BLR-1	1	1	0	13,753	0.0	0	0	$568	2	0	0	0	$277	$0	$4,987	18.00	0.49
7220	CO HQ BLDG	BLR-1	1	2	0	0	7.5	0	0	$31	0	0	0	3	$836	$0	$296	0.35	26.96
7220	CO HQ BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7220	CO HQ BLDG	CH-1	6	10	2	5,587	0.0	0	0	$275	1	0	1	0	$386	$0	$2,403	6.22	1.40
7220	CO HQ BLDG	CH-1	6	11	0	1,138	0.0	0	0	$47	0	0	0	2	$664	$0	$412	0.62	14.13
7220	CO HQ BLDG	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7220	CO HQ BLDG	CH-1	6	42	55	0	0.0	0	0	$1,394	1	0	0	0	$150	$0	$11,888	79.25	0.11
7220	CO HQ BLDG	FC-1	19	20	0	14,283	170.5	0	0	$1,292	1	0	1	2	$1,213	$0	$11,873	9.79	0.94
7220	CO HQ BLDG	HV-1	16	18	0	1,700	72.8	0	0	$370	1	0	0	1	$348	$0	$3,475	9.99	0.94
7220	CO HQ BLDG	HV-1	16	30	0	0	23.4	0	0	$96	0	1	0	3	$813	$0	$918	1.13	8.44
7220	CO HQ BLDG	HV-2	16	18	0	1,700	72.8	0	0	$370	1	0	0	1	$348	$0	$3,475	9.99	0.94
7220	CO HQ BLDG	HV-2	16	30	0	0	23.4	0	0	$96	0	1	0	3	$813	$0	$918	1.13	8.44
7220	CO HQ BLDG	HV-3	16	18	0	1,700	72.8	0	0	$370	1	0	0	1	$348	$0	$3,475	9.99	0.94
7220	CO HQ BLDG	HV-3	16	30	0	0	23.4	0	0	$96	0	1	0	3	$813	$0	$918	1.13	8.44
7220	CO HQ BLDG	HV-4	16	18	0	1,700	72.8	0	0	$370	1	0	0	1	$348	$0	$3,475	9.99	0.94
7220	CO HQ BLDG	HV-4	16	30	0	0	23.4	0	0	$96	0	1	0	3	$813	$0	$918	1.13	8.44
7220	CO HQ BLDG	HWP-1	26	24	0	8,524	0.0	3	0	$424	1	0	1	0	$386	$0	$3,705	9.60	0.91
7220	CO HQ BLDG	HWP-1	26	24	0	9,418	0.0	3	0	$461	1	0	1	0	$386	$0	$4,029	10.44	0.84
7243	ADMIN & SUPPORT BLDG	BLR-1	1	1	0	3,690	0.0	0	0	$152	2	0	0	0	$277	$0	$1,338	4.83	1.82
7243	ADMIN & SUPPORT BLDG	BLR-1	1	2	0	0	6.0	0	0	$25	0	0	0	3	$836	$0	$237	0.28	33.67
7243	ADMIN & SUPPORT BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7243	ADMIN & SUPPORT BLDG	CWP-1	26	24	0	1,205	0.0	3	0	$131	1	0	1	0	$386	$0	$1,126	2.92	2.96
7243	ADMIN & SUPPORT BLDG	EF-1	23	21	0	14,636	0.0	3	0	$676	1	0	0	2	$532	$0	$5,921	11.13	0.79
7243	ADMIN & SUPPORT BLDG	FC-1	19	20	0	8,072	30.5	0	0	$459	1	0	1	2	$1,213	$0	$4,124	3.40	2.64
7243	ADMIN & SUPPORT BLDG	H&V-1	16	18	0	1,237	56.6	0	0	$284	1	0	0	1	$348	$0	$2,670	7.67	1.22
7243	ADMIN & SUPPORT BLDG	H&V-1	16	30	0	0	18.2	0	0	$75	0	1	0	3	$813	$0	$714	0.88	10.86
7243	ADMIN & SUPPORT BLDG	RAD-1	25	23	0	1,845	0.0	3	0	$148	1	0	1	1	$570	$0	$1,283	2.25	3.85
7243	ADMIN & SUPPORT BLDG	UH-1	21	20	0	152	8.7	0	0	$42	1	0	1	2	$1,213	$0	$397	0.33	28.77
7245	ENL PERS DIN	AHU-1	11	18	7	14,219	166.0	0	0	$1,461	1	0	0	1	$348	$0	$13,296	38.21	0.24
7245	ENL PERS DIN	AHU-1	11	32	0	8,607	20.0	0	0	$438	0	3	0	11	$2,046	$0	$3,908	1.91	4.67
7245	ENL PERS DIN	AHU-1	11	33	0	399	18.2	0	0	$91	0	1	0	0	$272	$0	$859	3.16	2.98
7245	ENL PERS DIN	AHU-1	11	36	0	3,768	0.0	0	0	$156	0	0	0	2	$399	$0	$1,366	3.42	2.56
7245	ENL PERS DIN	AHU-1	11	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7245	ENL PERS DIN	AHU-2	11	18	7	14,435	170.1	0	0	$1,487	1	0	0	1	$348	$0	$13,536	38.90	0.23
7245	ENL PERS DIN	AHU-2	11	32	0	8,914	20.0	0	0	$451	0	3	0	11	$2,046	$0	$4,019	1.96	4.54
7245	ENL PERS DIN	AHU-2	11	33	0	413	18.8	0	0	$95	0	1	0	0	$272	$0	$890	3.27	2.87
7245	ENL PERS DIN	AHU-2	11	36	0	3,902	0.0	0	0	$161	0	0	0	2	$399	$0	$1,415	3.55	2.48
7245	ENL PERS DIN	AHU-2	11	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7245	ENL PERS DIN	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7245	ENL PERS DIN	CV-1	5	9	0	0	11.3	0	0	$47	0	1	0	3	$1,109	$0	$445	0.40	23.74
7245	ENL PERS DIN	CWP-1	26	24	3	7,917	0.0	3	0	$470	1	0	1	0	$386	$0	$4,093	10.60	0.82

7245	ENL PERS DIN	HRU-1	17	19	0	8,712	151.5	0	0	$984	2	0	0	2	$697	$0	$9,107	13.07	0.71
7245	ENL PERS DIN	HRU-1	17	30	0	0	1.5	0	0	$6	0	1	0	3	$813	$0	$58	0.07	134.06
7245	ENL PERS DIN	HRU-2	17	19	0	5,624	75.7	0	0	$544	2	0	0	2	$697	$0	$5,013	7.19	1.28
7245	ENL PERS DIN	HRU-2	17	30	0	0	0.7	0	0	$3	0	1	0	3	$813	$0	$29	0.04	268.11
7264	LIBRARY MAIN	AHU-1	15	18	7	37,237	231.8	0	0	$2,683	1	0	0	1	$348	$0	$24,223	69.61	0.13
7264	LIBRARY MAIN	AHU-1	15	27	0	1,242	23.7	0	0	$149	0	2	0	3	$1,097	$0	$1,379	1.26	7.37
7264	LIBRARY MAIN	AHU-1	15	33	0	0	9.3	0	0	$38	0	1	0	0	$272	$0	$364	1.34	7.12
7264	LIBRARY MAIN	AHU-1	15	36	0	1,060	0.0	0	0	$44	0	0	0	2	$399	$0	$384	0.96	9.12
7264	LIBRARY MAIN	AHU-2	15	18	7	37,237	231.8	0	0	$2,683	1	0	0	1	$348	$0	$24,223	69.61	0.13
7264	LIBRARY MAIN	AHU-2	15	27	0	1,242	23.7	0	0	$149	0	2	0	3	$1,097	$0	$1,379	1.26	7.37
7264	LIBRARY MAIN	AHU-2	15	33	0	0	9.3	0	0	$38	0	1	0	0	$272	$0	$364	1.34	7.12
7264	LIBRARY MAIN	AHU-2	15	36	0	1,060	0.0	0	0	$44	0	0	0	2	$399	$0	$384	0.96	9.12
7264	LIBRARY MAIN	AHU-3	15	18	7	20,312	130.7	0	0	$1,567	1	0	0	1	$348	$0	$14,117	40.57	0.22
7264	LIBRARY MAIN	AHU-3	15	27	0	3,215	23.7	0	0	$230	0	2	0	3	$1,097	$0	$2,095	1.91	4.76
7264	LIBRARY MAIN	AHU-3	15	33	0	0	8.9	0	0	$37	0	1	0	0	$272	$0	$350	1.28	7.42
7264	LIBRARY MAIN	AHU-3	15	36	0	2,742	0.0	0	0	$113	0	0	0	2	$399	$0	$994	2.49	3.52
7264	LIBRARY MAIN	AHU-4	15	18	11	59,479	351.9	0	0	$4,186	1	0	0	1	$348	$0	$37,774	108.54	0.08
7264	LIBRARY MAIN	AHU-4	15	27	0	2,355	57.1	0	0	$332	0	2	0	3	$1,097	$0	$3,094	2.82	3.30
7264	LIBRARY MAIN	AHU-4	15	33	0	0	13.2	0	0	$54	0	1	0	0	$272	$0	$517	1.90	5.01
7264	LIBRARY MAIN	AHU-4	15	36	0	2,009	0.0	0	0	$83	0	0	0	2	$399	$0	$728	1.83	4.81
7264	LIBRARY MAIN	AHU-5	15	18	1	4,738	35.0	0	0	$363	1	0	0	1	$348	$0	$3,293	9.46	0.96
7264	LIBRARY MAIN	AHU-5	15	27	0	259	11.1	0	0	$57	0	2	0	3	$1,097	$0	$531	0.48	19.40
7264	LIBRARY MAIN	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7264	LIBRARY MAIN	CH-1	6	10	5	20,485	0.0	0	0	$982	1	0	1	0	$386	$0	$8,585	22.24	0.39
7264	LIBRARY MAIN	CH-1	6	11	0	1,050	0.0	0	0	$43	0	0	0	2	$664	$0	$381	0.57	15.31
7264	LIBRARY MAIN	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7264	LIBRARY MAIN	CH-1	6	42	50	0	0.0	0	0	$1,286	1	0	0	0	$150	$0	$10.974	73.16	0.12
7264	LIBRARY MAIN	CH-2	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
7264	LIBRARY MAIN	RAD-1	27	25	0	0	0.0	3	0	$72	0	1	0	1	$456	$0	$614	1.35	6.33
7270	BN HQ BLDG	AHU-1	10	18	5	53,776	331.1	0	0	$3,703	1	0	0	1	$348	$0	$33,504	96.28	0.09
7270	BN HQ BLDG	AHU-1	10	29	0	4,063	70.6	0	0	$459	0	7	0	8	$3,378	$0	$4,247	1.26	7.36
7270	BN HQ BLDG	AHU-1	10	33	0	198	12.5	0	0	$60	0	1	0	0	$272	$0	$561	2.06	4.57
7270	BN HQ BLDG	AHU-1	10	35	0	1,386	0.0	0	0	$57	0	0	0	2	$399	$0	$503	1.26	6.97
7270	BN HQ BLDG	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7270	BN HQ BLDG	BLR-1	1	1	0	2,703	0.0	0	0	$112	2	0	0	0	$277	$0	$980	3.54	2.48
7270	BN HQ BLDG	BLR-1	1	2	0	0	2.6	0	0	$11	0	0	0	3	$836	$0	$100	0.12	79.53
7270	BN HQ BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7270	BN HQ BLDG	CH-1	8	17	21	438	0.0	3	0	$626	1	0	1	0	$243	$0	$5,345	22.00	0.39
7270	BN HQ BLDG	RAD-1	27	25	0	0	0.0	3	0	$72	0	1	0	1	$456	$0	$614	1.35	6.33
7285	CLOTHING SALES	AHU-1	15	18	0	89,816	2,143.1	0	0	$12,539	1	0	0	1	$348	$0	$116,715	335.39	0.03
7285	CLOTHING SALES	AHU-1	15	27	0	12,091	1,013.1	0	0	$4,673	0	2	0	3	$1,097	$0	$44,161	40.26	0.23

[illegible]	[illegible]	[illegible]	TYPE	[illegible]	SVGS PER YR	SVGS PER YR	MBtu SVGS PER YR	HOUR SVGS PER YR	PER YR	SVGS PER YR	DO PNT	AO PNT	DI PNT	AI PNT	CONSTR COST	[illegible]	DISC SAVINGS	[illegible]	[illegible]
7285	CLOTHING SALES	AHU-1	15	33	0	133	9.9	0	0	$46	0	1	0	0	$272	$0	$438	1.61	5.87
7285	CLOTHING SALES	AHU-1	15	36	0	14,626	0.0	0	0	$604	0	0	0	2	$399	$0	$5,304	13.29	0.66
7285	CLOTHING SALES	BLR-1	1	1	0	2,789	0.0	0	0	$115	2	0	0	0	$277	$0	$1,011	3.65	2.40
7285	CLOTHING SALES	BLR-1	1	2	0	0	11.3	0	0	$47	0	0	0	3	$836	$0	$445	0.53	17.89
7285	CLOTHING SALES	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7285	CLOTHING SALES	CH-1	9	10	4	14,354	0.0	0	0	$698	1	0	1	0	$386	$0	$6,101	15.80	0.55
7285	CLOTHING SALES	CH-1	9	13	0	700	0.0	11	0	$293	1	1	1	7	$3,527	$0	$2,506	0.71	12.04
7285	CLOTHING SALES	CH-1	9	15	34	0	0.0	0	0	$858	2	1	1	2	$1,545	$0	$7,316	4.74	1.80
7305	APP INSTR BLDG	ACCU-1	8	17	3	70	0.0	3	0	$161	1	0	1	0	$243	$0	$1,371	5.64	1.51
7305	APP INSTR BLDG	ACCU-2	8	17	3	70	0.0	3	0	$161	1	0	1	0	$243	$0	$1,371	5.64	1.51
7305	APP INSTR BLDG	ACCU-3	8	17	3	70	0.0	3	0	$161	1	0	1	0	$243	$0	$1,371	5.64	1.51
7305	APP INSTR BLDG	ACCU-4	8	17	2	47	0.0	3	0	$132	1	0	1	0	$243	$0	$1,125	4.63	1.84
7305	APP INSTR BLDG	AHU-1	15	18	1	4,481	80.7	0	0	$541	1	0	0	1	$348	$0	$4,995	14.35	0.64
7305	APP INSTR BLDG	AHU-1	15	27	0	604	23.5	0	0	$122	0	2	0	3	$1,097	$0	$1,143	1.04	9.00
7305	APP INSTR BLDG	AHU-1	15	33	0	0	3.5	0	0	$14	0	1	0	0	$272	$0	$136	0.50	19.00
7305	APP INSTR BLDG	AHU-1	15	36	0	515	0.0	0	0	$21	0	0	0	2	$399	$0	$187	0.47	18.76
7305	APP INSTR BLDG	AHU-2	15	18	1	4,481	80.7	0	0	$541	1	0	0	1	$348	$0	$4,995	14.35	0.64
7305	APP INSTR BLDG	AHU-2	15	27	0	604	23.5	0	0	$122	0	2	0	3	$1,097	$0	$1,143	1.04	9.00
7305	APP INSTR BLDG	AHU-2	15	33	0	0	3.5	0	0	$14	0	1	0	0	$272	$0	$136	0.50	19.00
7305	APP INSTR BLDG	AHU-2	15	36	0	515	0.0	0	0	$21	0	0	0	2	$399	$0	$187	0.47	18.76
7305	APP INSTR BLDG	AHU-3	15	18	1	4,481	80.7	0	0	$541	1	0	0	1	$348	$0	$4,995	14.35	0.64
7305	APP INSTR BLDG	AHU-3	15	27	0	604	23.5	0	0	$122	0	2	0	3	$1,097	$0	$1,143	1.04	9.00
7305	APP INSTR BLDG	AHU-3	15	33	0	0	3.5	0	0	$14	0	1	0	0	$272	$0	$136	0.50	19.00
7305	APP INSTR BLDG	AHU-3	15	36	0	515	0.0	0	0	$21	0	0	0	2	$399	$0	$187	0.47	18.76
7305	APP INSTR BLDG	AHU-4	15	18	1	3,803	31.7	0	0	$311	1	0	0	1	$348	$0	$2,823	8.11	1.12
7305	APP INSTR BLDG	AHU-4	15	27	0	403	12.8	0	0	$70	0	2	0	3	$1,097	$0	$650	0.59	15.78
7305	APP INSTR BLDG	AHU-4	15	33	0	0	1.2	0	0	$5	0	1	0	0	$272	$0	$45	0.17	56.99
7305	APP INSTR BLDG	AHU-4	15	36	0	343	0.0	0	0	$14	0	0	0	2	$399	$0	$125	0.31	28.13
7350	VEH MNT SHOP ORG	AHU-1	15	18	0	1,845	43.8	0	0	$256	1	0	0	1	$348	$0	$2,387	6.86	1.36
7350	VEH MNT SHOP ORG	AHU-1	15	27	0	0	18.8	0	0	$78	0	2	0	3	$1,097	$0	$740	0.67	14.13
7350	VEH MNT SHOP ORG	AHU-2	15	18	0	1,845	52.5	0	0	$293	1	0	0	1	$348	$0	$2,731	7.85	1.19
7350	VEH MNT SHOP ORG	AHU-2	15	27	0	0	22.6	0	0	$93	0	2	0	3	$1,097	$0	$888	0.81	11.78
7350	VEH MNT SHOP ORG	AHU-3	15	18	0	1,845	52.5	0	0	$293	1	0	0	1	$348	$0	$2,731	7.85	1.19
7350	VEH MNT SHOP ORG	AHU-3	15	27	0	0	22.6	0	0	$93	0	2	0	3	$1,097	$0	$888	0.81	11.78
7350	VEH MNT SHOP ORG	AHU-4	15	18	0	1,845	52.5	0	0	$293	1	0	0	1	$348	$0	$2,731	7.85	1.19
7350	VEH MNT SHOP ORG	AHU-4	15	27	0	0	22.6	0	0	$93	0	2	0	3	$1,097	$0	$888	0.81	11.78
7350	VEH MNT SHOP ORG	AHU-5	15	18	0	1,845	61.3	0	0	$329	1	0	0	1	$348	$0	$3,075	8.83	1.06
7350	VEH MNT SHOP ORG	AHU-5	15	27	0	0	26.4	0	0	$109	0	2	0	3	$1,097	$0	$1,036	0.94	10.09
7350	VEH MNT SHOP ORG	AHU-6	15	18	0	4,937	131.3	0	0	$745	1	0	0	1	$348	$0	$6,945	19.96	0.47
7350	VEH MNT SHOP ORG	AHU-6	15	27	0	0	56.5	0	0	$233	0	2	0	3	$1,097	$0	$2,219	2.02	4.71
7350	VEH MNT SHOP ORG	MAU-1	16	18	0	6,245	0.0	0	0	$258	1	0	0	1	$348	$0	$2,265	6.51	1.35

7350	VEH MNT SHOP ORG	MAU-1	16	30	0	0	30.1	0	0	$124	0	1	0	3	$813	$0	$1,181	1.45	6.56
7350	VEH MNT SHOP ORG	MAU-2	16	18	0	6,245	0.0	0	0	$258	1	0	0	1	$348	$0	$2,265	6.51	1.35
7350	VEH MNT SHOP ORG	MAU-2	16	30	0	0	30.1	0	0	$124	0	1	0	3	$813	$0	$1,181	1.45	6.56
7350	VEH MNT SHOP ORG	MAU-3	16	18	0	21,981	0.0	0	0	$908	1	0	0	1	$348	$0	$7,971	22.90	0.38
7350	VEH MNT SHOP ORG	MAU-3	16	30	0	0	60.1	0	0	$248	0	1	0	3	$813	$0	$2,361	2.90	3.28
7350	VEH MNT SHOP ORG	RAD-1	20	20	0	1,845	210.0	0	0	$942	1	0	1	2	$1,213	$0	$8,916	7.35	1.29
7350	VEH MNT SHOP ORG	RAD-2	20	20	0	1,237	140.0	0	0	$628	1	0	1	2	$1,213	$0	$5,947	4.90	1.93
7404	ENL BARRACKS W/O DIN	AHU-1	10	18	4	0	0.0	0	0	$105	1	0	0	1	$348	$0	$896	2.57	3.31
7404	ENL BARRACKS W/O DIN	AHU-1	10	29	0	14,390	0.0	0	0	$594	0	7	0	8	$3,378	$0	$5,218	1.54	5.68
7404	ENL BARRACKS W/O DIN	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7404	ENL BARRACKS W/O DIN	AHU-2	10	18	4	0	0.0	0	0	$105	1	0	0	1	$348	$0	$896	2.57	3.31
7404	ENL BARRACKS W/O DIN	AHU-2	10	29	0	13,941	0.0	0	0	$576	0	7	0	8	$3,378	$0	$5,055	1.50	5.87
7404	ENL BARRACKS W/O DIN	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7404	ENL BARRACKS W/O DIN	BLR-1	1	2	0	0	18.2	0	0	$75	0	0	0	3	$836	$0	$715	0.85	11.15
7404	ENL BARRACKS W/O DIN	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7404	ENL BARRACKS W/O DIN	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7404	ENL BARRACKS W/O DIN	RAD-1	25	23	0	933	0.0	3	0	$111	1	0	1	1	$570	$0	$953	1.67	5.16
7404	ENL BARRACKS W/O DIN	RAD-2	25	23	0	467	0.0	3	0	$91	1	0	1	1	$570	$0	$783	1.37	6.24
7410	BN ADMIN & CLRM	AHU-1	11	18	11	75,332	237.6	0	0	$4,370	1	0	0	1	$348	$0	$39,035	112.17	0.08
7410	BN ADMIN & CLRM	AHU-1	11	32	0	3,362	90.3	0	0	$511	0	3	0	11	$3,695	$0	$4,766	1.29	7.23
7410	BN ADMIN & CLRM	AHU-1	11	33	0	96	6.1	0	0	$29	0	1	0	0	$272	$0	$274	1.01	9.37
7410	BN ADMIN & CLRM	AHU-1	11	36	0	1,147	0.0	0	0	$47	0	0	0	2	$399	$0	$416	1.04	8.42
7410	BN ADMIN & CLRM	AHU-1	11	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7410	BN ADMIN & CLRM	BLR-1	1	1	0	414	0.0	0	0	$17	2	0	0	0	$277	$0	$150	0.54	16.21
7410	BN ADMIN & CLRM	BLR-1	1	2	0	0	2.6	0	0	$11	0	0	0	3	$836	$0	$100	0.12	79.53
7410	BN ADMIN & CLRM	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7410	BN ADMIN & CLRM	CH-1	6	10	1	3,345	0.0	0	0	$162	1	0	1	0	$386	$0	$1,414	3.66	2.39
7410	BN ADMIN & CLRM	CH-1	6	11	0	525	0.0	0	0	$22	0	0	0	2	$664	$0	$190	0.29	30.62
7410	BN ADMIN & CLRM	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7410	BN ADMIN & CLRM	CH-1	6	42	25	0	0.0	0	0	$643	1	0	0	0	$150	$0	$5,487	36.58	0.23
7424	ENL BARRACKS W/O DIN	AHU-1	10	18	4	0	0.0	0	0	$105	1	0	0	1	$348	$0	$896	2.57	3.31
7424	ENL BARRACKS W/O DIN	AHU-1	10	29	0	14,390	0.0	0	0	$594	0	7	0	8	$3,378	$0	$5,218	1.54	5.68
7424	ENL BARRACKS W/O DIN	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7424	ENL BARRACKS W/O DIN	AHU-2	10	18	4	0	0.0	0	0	$105	1	0	0	1	$348	$0	$896	2.57	3.31
7424	ENL BARRACKS W/O DIN	AHU-2	10	29	0	13,941	0.0	0	0	$576	0	7	0	8	$3,378	$0	$5,055	1.50	5.87
7424	ENL BARRACKS W/O DIN	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7424	ENL BARRACKS W/O DIN	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7424	ENL BARRACKS W/O DIN	BLR-2	1	2	0	0	4.6	0	0	$19	0	0	0	3	$836	$0	$181	0.22	44.02
7424	ENL BARRACKS W/O DIN	BLR-2	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7424	ENL BARRACKS W/O DIN	RAD-1	25	23	0	0	0.0	3	0	$72	1	0	1	1	$570	$0	$614	1.08	7.92
7424	ENL BARRACKS W/O DIN	RAD-2	25	23	0	0	0.0	3	0	$72	1	0	1	1	$570	$0	$614	1.08	7.92

7432	ADMIN & SUPPORT BLDG	BLR-1	1	1	0	14,924	0.0	0	0	$616	2	0	0	0	$277	$0	$5,412	19.54	0.45
7432	ADMIN & SUPPORT BLDG	BLR-1	1	2	0	0	6.3	0	0	$26	0	0	0	3	$836	$0	$249	0.30	31.98
7432	ADMIN & SUPPORT BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7432	ADMIN & SUPPORT BLDG	CH-1	6	10	2	6,040	0.0	0	0	$294	1	0	1	0	$386	$0	$2,567	6.65	1.31
7432	ADMIN & SUPPORT BLDG	CH-1	6	11	0	350	0.0	0	0	$14	0	0	0	2	$664	$0	$127	0.19	45.94
7432	ADMIN & SUPPORT BLDG	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7432	ADMIN & SUPPORT BLDG	CH-1	6	42	17	0	0.0	0	0	$429	1	0	0	0	$150	$0	$3,658	24.39	0.35
7432	ADMIN & SUPPORT BLDG	FC-1	19	20	0	26,569	154.6	0	0	$1,734	1	0	1	2	$1,213	$0	$15,706	12.95	0.70
7432	ADMIN & SUPPORT BLDG	HV-1	16	18	0	3,520	57.4	0	0	$382	1	0	0	1	$348	$0	$3,532	10.15	0.91
7432	ADMIN & SUPPORT BLDG	HV-1	16	30	0	0	18.4	0	0	$76	0	1	0	3	$813	$0	$724	0.89	10.70
7432	ADMIN & SUPPORT BLDG	HV-2	16	18	0	3,520	57.4	0	0	$382	1	0	0	1	$348	$0	$3,532	10.15	0.91
7432	ADMIN & SUPPORT BLDG	HV-2	16	30	0	0	18.4	0	0	$76	0	1	0	3	$813	$0	$724	0.89	10.70
7432	ADMIN & SUPPORT BLDG	HV-3	16	18	0	3,520	57.4	0	0	$382	1	0	0	1	$348	$0	$3,532	10.15	0.91
7432	ADMIN & SUPPORT BLDG	HV-3	16	30	0	0	18.4	0	0	$76	0	1	0	3	$813	$0	$724	0.89	10.70
7432	ADMIN & SUPPORT BLDG	HV-4	16	18	0	3,520	57.4	0	0	$382	1	0	0	1	$348	$0	$3,532	10.15	0.91
7432	ADMIN & SUPPORT BLDG	HV-4	16	30	0	0	18.4	0	0	$76	0	1	0	3	$813	$0	$724	0.89	10.70
7432	ADMIN & SUPPORT BLDG	HV-5	16	18	0	3,520	57.4	0	0	$382	1	0	0	1	$348	$0	$3,532	10.15	0.91
7432	ADMIN & SUPPORT BLDG	HV-5	16	30	0	0	18.4	0	0	$76	0	1	0	3	$813	$0	$724	0.89	10.70
7450	REGIMENTAL HQ BLDG	AHU-1	15	18	1	8,625	88.1	0	0	$743	1	0	0	1	$348	$0	$6,788	19.51	0.47
7450	REGIMENTAL HQ BLDG	AHU-1	15	27	0	551	7.7	0	0	$55	0	2	0	3	$1,097	$0	$503	0.46	20.11
7450	REGIMENTAL HQ BLDG	AHU-1	15	36	0	188	0.0	0	0	$8	0	0	0	2	$399	$0	$68	0.17	51.36
7450	REGIMENTAL HQ BLDG	BLR-1	1	1	0	1,773	0.0	0	0	$73	2	0	0	0	$277	$0	$643	2.32	3.78
7450	REGIMENTAL HQ BLDG	BLR-1	1	2	0	0	2.6	0	0	$11	0	0	0	3	$836	$0	$100	0.12	79.53
7450	REGIMENTAL HQ BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7450	REGIMENTAL HQ BLDG	CH-1	6	10	3	9,380	0.0	0	0	$459	1	0	1	0	$386	$0	$4,009	10.39	0.84
7450	REGIMENTAL HQ BLDG	CH-1	6	11	0	522	0.0	0	0	$22	0	0	0	2	$664	$0	$189	0.28	30.83
7450	REGIMENTAL HQ BLDG	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7450	REGIMENTAL HQ BLDG	CH-1	6	42	25	0	0.0	0	0	$639	1	0	0	0	$150	$0	$5,450	36.34	0.23
7450	REGIMENTAL HQ BLDG	FC-1	19	20	0	18,742	22.3	0	0	$866	1	0	1	2	$1,213	$0	$7,674	6.33	1.40
7450	REGIMENTAL HQ BLDG	RAD-1	27	25	0	0	0.0	3	0	$72	0	1	0	1	$456	$0	$614	1.35	6.33
7485	BOWLING ALLEY	AHU-1	18	19	28	181,291	585.0	0	0	$10,602	2	0	0	2	$697	$0	$94,713	135.89	0.07
7485	BOWLING ALLEY	AHU-1	18	28	0	6,868	175.2	0	0	$1,005	1	7	0	9	$3,761	$0	$9,368	2.49	3.74
7485	BOWLING ALLEY	AHU-1	18	34	0	245	21.8	0	0	$100	0	1	0	0	$272	$0	$943	3.47	2.73
7485	BOWLING ALLEY	AHU-1	18	37	0	1,341	0.0	0	0	$55	0	0	0	2	$399	$0	$486	1.22	7.21
7485	BOWLING ALLEY	AHU-1	18	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7485	BOWLING ALLEY	AHU-2	11	18	14	102,550	298.4	0	0	$5,826	1	0	0	1	$348	$0	$51,988	149.39	0.06
7485	BOWLING ALLEY	AHU-2	11	32	0	4,292	175.2	0	0	$899	0	3	0	11	$4,794	$0	$8,435	1.76	5.33
7485	BOWLING ALLEY	AHU-2	11	33	0	77	6.8	0	0	$31	0	1	0	0	$272	$0	$295	1.08	8.72
7485	BOWLING ALLEY	AHU-2	11	36	0	838	0.0	0	0	$35	0	0	0	2	$399	$0	$304	0.76	11.53
7485	BOWLING ALLEY	AHU-2	11	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7485	BOWLING ALLEY	BLR-1	1	1	0	8,814	0.0	0	0	$364	2	0	0	0	$277	$0	$3,196	11.54	0.76

[illegible]	[illegible]	EQUIP TAG NO	SYS TYPE	UPGR RUN NUMBER	KW SVGS PER YR	KWH SVGS. PER YR	MBTU SVGS. PER YR	LABOR HOURS SVGS PER YR	MATL SAVGS. PER YR	COST SVGS. PER YR	DO PNT	[illegible] PNT	[illegible] PNT	[illegible] PNT	TOTAL [illegible] COST	RECUR COSTS PER YR	TOTAL MISC SAVINGS	[illegible]	[illegible]
7485	BOWLING ALLEY	BLR-1	1	2	0	0	11.3	0	0	$47	0	0	0	3	$836	$0	$445	0.53	17.89
7485	BOWLING ALLEY	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7485	BOWLING ALLEY	CH-1	8	17	50	1,050	0.0	3	0	$1,402	1	0	1	0	$243	$0	$11,969	49.25	0.17
7485	BOWLING ALLEY	CH-2	8	17	24	490	0.0	3	0	$693	1	0	1	0	$243	$0	$5,913	24.33	0.35
7485	BOWLING ALLEY	UH-1	21	20	0	893	14.6	0	0	$97	1	0	1	2	$1,213	$0	$898	0.74	12.49
7485	BOWLING ALLEY	UH-2	21	20	0	893	14.6	0	0	$97	1	0	1	2	$1,213	$0	$898	0.74	12.49
7500	VEH MNT SHOP ORG	AHU-1	15	18	0	3,685	64.1	0	0	$416	1	0	0	1	$348	$0	$3,852	11.07	0.84
7500	VEH MNT SHOP ORG	AHU-1	15	27	0	0	27.6	0	0	$114	0	2	0	3	$1,097	$0	$1,083	0.99	9.65
7500	VEH MNT SHOP ORG	AHU-2	15	18	0	1,932	45.8	0	0	$268	1	0	0	1	$348	$0	$2,498	7.18	1.30
7500	VEH MNT SHOP ORG	AHU-2	15	27	0	0	19.7	0	0	$81	0	2	0	3	$1,097	$0	$774	0.71	13.51
7500	VEH MNT SHOP ORG	AHU-3	15	18	0	1,932	45.8	0	0	$268	1	0	0	1	$348	$0	$2,498	7.18	1.30
7500	VEH MNT SHOP ORG	AHU-3	15	27	0	0	19.7	0	0	$81	0	2	0	3	$1,097	$0	$774	0.71	13.51
7500	VEH MNT SHOP ORG	AHU-4	15	18	0	1,932	45.8	0	0	$268	1	0	0	1	$348	$0	$2,498	7.18	1.30
7500	VEH MNT SHOP ORG	AHU-4	15	27	0	0	19.7	0	0	$81	0	2	0	3	$1,097	$0	$774	0.71	13.51
7500	VEH MNT SHOP ORG	AHU-5	15	18	0	1,932	54.9	0	0	$306	1	0	0	1	$348	$0	$2,857	8.21	1.14
7500	VEH MNT SHOP ORG	AHU-5	15	27	0	0	23.6	0	0	$97	0	2	0	3	$1,097	$0	$928	0.85	11.26
7500	VEH MNT SHOP ORG	AHU-6	15	18	0	5,169	119.0	0	0	$704	1	0	0	1	$348	$0	$6,547	18.81	0.49
7500	VEH MNT SHOP ORG	AHU-6	15	27	0	0	51.2	0	0	$211	0	2	0	3	$1,097	$0	$2,012	1.83	5.20
7500	VEH MNT SHOP ORG	MAU-1	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29
7500	VEH MNT SHOP ORG	MAU-1	16	30	0	0	31.5	0	0	$130	0	1	0	3	$813	$0	$1,235	1.52	6.27
7500	VEH MNT SHOP ORG	MAU-2	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29
7500	VEH MNT SHOP ORG	MAU-2	16	30	0	0	31.5	0	0	$130	0	1	0	3	$813	$0	$1,235	1.52	6.27
7500	VEH MNT SHOP ORG	MAU-3	16	18	0	23,016	0.0	0	0	$951	1	0	0	1	$348	$0	$8,346	23.98	0.37
7500	VEH MNT SHOP ORG	MAU-3	16	30	0	0	62.9	0	0	$259	0	1	0	3	$813	$0	$2,470	3.04	3.14
7500	VEH MNT SHOP ORG	RAD-1	20	20	0	1,932	219.7	0	0	$985	1	0	1	2	$1,213	$0	$9,326	7.69	1.23
7500	VEH MNT SHOP ORG	RAD-2	20	20	0	1,295	146.5	0	0	$657	1	0	1	2	$1,213	$0	$6,220	5.13	1.85
7520	VEH MNT SHOP ORG	AHU-1	15	18	0	3,685	77.8	0	0	$473	1	0	0	1	$348	$0	$4,392	12.62	0.74
7520	VEH MNT SHOP ORG	AHU-1	15	27	0	0	33.5	0	0	$138	0	2	0	3	$1,097	$0	$1,316	1.20	7.95
7520	VEH MNT SHOP ORG	AHU-2	15	18	0	1,932	55.6	0	0	$309	1	0	0	1	$348	$0	$2,883	8.28	1.13
7520	VEH MNT SHOP ORG	AHU-2	15	27	0	0	23.9	0	0	$99	0	2	0	3	$1,097	$0	$940	0.86	11.13
7520	VEH MNT SHOP ORG	AHU-3	15	18	0	1,932	55.6	0	0	$309	1	0	0	1	$348	$0	$2,883	8.28	1.13
7520	VEH MNT SHOP ORG	AHU-3	15	27	0	0	23.9	0	0	$99	0	2	0	3	$1,097	$0	$940	0.86	11.13
7520	VEH MNT SHOP ORG	AHU-4	15	18	0	1,932	55.6	0	0	$309	1	0	0	1	$348	$0	$2,883	8.28	1.13
7520	VEH MNT SHOP ORG	AHU-4	15	27	0	0	23.9	0	0	$99	0	2	0	3	$1,097	$0	$940	0.86	11.13
7520	VEH MNT SHOP ORG	AHU-5	15	18	0	1,932	66.7	0	0	$355	1	0	0	1	$348	$0	$3,320	9.54	0.98
7520	VEH MNT SHOP ORG	AHU-5	15	27	0	0	28.7	0	0	$118	0	2	0	3	$1,097	$0	$1,128	1.03	9.27
7520	VEH MNT SHOP ORG	AHU-6	15	18	0	5,169	144.5	0	0	$809	1	0	0	1	$348	$0	$7,549	21.69	0.43
7520	VEH MNT SHOP ORG	AHU-6	15	27	0	0	62.2	0	0	$256	0	2	0	3	$1,097	$0	$2,443	2.23	4.28
7520	VEH MNT SHOP ORG	MAU-1	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29
7520	VEH MNT SHOP ORG	MAU-1	16	30	0	0	38.2	0	0	$157	0	1	0	3	$813	$0	$1,500	1.84	5.17
7520	VEH MNT SHOP ORG	MAU-2	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29

7520	VEH MNT SHOP ORG	MAU-2	16	30	0	0	38.2	0	0	$157	0	1	0	3	$813	$0	$1,500	1.84	5.17
7520	VEH MNT SHOP ORG	MAU-3	16	18	0	15,626	0.0	0	0	$645	1	0	0	1	$348	$0	$5,666	16.28	0.54
7520	VEH MNT SHOP ORG	MAU-3	16	30	0	0	76.4	0	0	$315	0	1	0	3	$813	$0	$2,999	3.69	2.58
7520	VEH MNT SHOP ORG	RAD-1	20	20	0	1,932	266.8	0	0	$1,179	1	0	1	2	$1,213	$0	$11,176	9.21	1.03
7520	VEH MNT SHOP ORG	RAD-2	20	20	0	1,295	177.9	0	0	$786	1	0	1	2	$1,213	$0	$7,453	6.14	1.54
7602	ADMIN & SUPPORT BLDG	AHU-1	15	18	0	2,532	0.0	0	0	$113	1	0	0	1	$348	$0	$993	2.85	3.07
7602	ADMIN & SUPPORT BLDG	AHU-1	15	27	0	47	0.0	0	0	$2	0	2	0	3	$1,097	$0	$17	0.02	567.42
7602	ADMIN & SUPPORT BLDG	AHU-2	15	18	0	2,532	0.0	0	0	$113	1	0	0	1	$348	$0	$993	2.85	3.07
7602	ADMIN & SUPPORT BLDG	AHU-2	15	27	0	47	0.0	0	0	$2	0	2	0	3	$1,097	$0	$17	0.02	567.42
7602	ADMIN & SUPPORT BLDG	AHU-3	15	18	0	2,532	0.0	0	0	$113	1	0	0	1	$348	$0	$993	2.85	3.07
7602	ADMIN & SUPPORT BLDG	AHU-3	15	27	0	47	0.0	0	0	$2	0	2	0	3	$1,097	$0	$17	0.02	567.42
7602	ADMIN & SUPPORT BLDG	AHU-4	15	18	0	2,532	0.0	0	0	$113	1	0	0	1	$348	$0	$993	2.85	3.07
7602	ADMIN & SUPPORT BLDG	AHU-4	15	27	0	47	0.0	0	0	$2	0	2	0	3	$1,097	$0	$17	0.02	567.42
7602	ADMIN & SUPPORT BLDG	AHU-5	15	18	0	2,532	0.0	0	0	$113	1	0	0	1	$348	$0	$993	2.85	3.07
7602	ADMIN & SUPPORT BLDG	AHU-5	15	27	0	47	0.0	0	0	$2	0	2	0	3	$1,097	$0	$17	0.02	567.42
7602	ADMIN & SUPPORT BLDG	BLR-1	1	2	0	0	5.7	0	0	$23	0	0	0	3	$836	$0	$223	0.27	35.79
7602	ADMIN & SUPPORT BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7602	ADMIN & SUPPORT BLDG	CH-1	6	10	1	2,298	0.0	0	0	$112	1	0	1	0	$386	$0	$977	2.53	3.45
7602	ADMIN & SUPPORT BLDG	CH-1	6	11	0	263	0.0	0	0	$11	0	0	0	2	$664	$0	$95	0.14	61.25
7602	ADMIN & SUPPORT BLDG	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7602	ADMIN & SUPPORT BLDG	CH-1	6	42	13	0	0.0	0	0	$322	1	0	0	0	$150	$0	$2,743	18.29	0.47
7602	ADMIN & SUPPORT BLDG	RAD-1	25	23	0	2,768	0.0	3	0	$186	1	0	1	1	$570	$0	$1,618	2.84	3.06
7604	GEN INST BLDG	AHU-1	10	18	7	26,058	145.0	0	0	$1,864	1	0	0	1	$348	$0	$16,764	48.17	0.19
7604	GEN INST BLDG	AHU-1	10	29	0	2,070	52.3	0	0	$301	0	7	0	8	$3,378	$0	$2,802	0.83	11.23
7604	GEN INST BLDG	AHU-1	10	33	0	0	5.8	0	0	$24	0	1	0	0	$272	$0	$227	0.84	11.40
7604	GEN INST BLDG	AHU-1	10	35	0	1,766	0.0	0	0	$73	0	0	0	2	$399	$0	$640	1.60	5.47
7604	GEN INST BLDG	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7604	GEN INST BLDG	AHU-2	10	18	7	26,058	145.0	0	0	$1,864	1	0	0	1	$348	$0	$16,764	48.17	0.19
7604	GEN INST BLDG	AHU-2	10	29	0	2,070	52.3	0	0	$301	0	7	0	8	$3,378	$0	$2,802	0.83	11.23
7604	GEN INST BLDG	AHU-2	10	33	0	0	5.8	0	0	$24	0	1	0	0	$272	$0	$227	0.84	11.40
7604	GEN INST BLDG	AHU-2	10	35	0	1,766	0.0	0	0	$73	0	0	0	2	$399	$0	$640	1.60	5.47
7604	GEN INST BLDG	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7604	GEN INST BLDG	AHU-3	15	18	3	10,339	42.8	0	0	$683	1	0	0	1	$348	$0	$6,108	17.55	0.51
7604	GEN INST BLDG	AHU-3	15	27	0	690	11.6	0	0	$76	0	2	0	3	$1,097	$0	$706	0.64	14.37
7604	GEN INST BLDG	AHU-3	15	33	0	0	1.9	0	0	$8	0	1	0	0	$272	$0	$76	0.28	34.20
7604	GEN INST BLDG	AHU-3	15	36	0	589	0.0	0	0	$24	0	0	0	2	$399	$0	$213	0.53	16.41
7604	GEN INST BLDG	BLR-1	1	1	0	5,247	0.0	0	0	$217	2	0	0	0	$277	$0	$1,903	6.87	1.28
7604	GEN INST BLDG	BLR-1	1	2	0	0	5.0	0	0	$20	0	0	0	3	$836	$0	$195	0.23	40.81
7604	GEN INST BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7604	GEN INST BLDG	CH-1	6	10	1	3,405	0.0	0	0	$170	1	0	1	0	$386	$0	$1,489	3.86	2.26
7604	GEN INST BLDG	CH-1	6	11	0	1,225	0.0	0	0	$51	0	0	0	2	$664	$0	$444	0.67	13.12

7604	GEN INST BLDG	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7604	GEN INST BLDG	CH-1	6	42	59	0	0.0	0	0	$1,501	1	0	0	0	$150	$0	$12,803	85.35	0.10
7604	GEN INST BLDG	HWP-1	26	24	0	4,776	0.0	3	0	$269	1	0	1	0	$386	$0	$2,346	6.08	1.43
7606	ENL PERS DIN	AHU-1	11	18	5	11,113	164.2	0	0	$1,253	1	0	0	1	$348	$0	$11,481	32.99	0.28
7606	ENL PERS DIN	AHU-1	11	32	0	8,607	19.3	0	0	$435	0	3	0	11	$2,046	$0	$3,880	1.90	4.70
7606	ENL PERS DIN	AHU-1	11	33	0	399	18.2	0	0	$91	0	1	0	0	$272	$0	$859	3.16	2.98
7606	ENL PERS DIN	AHU-1	11	36	0	3,768	0.0	0	0	$156	0	0	0	2	$399	$0	$1,366	3.42	2.56
7606	ENL PERS DIN	AHU-1	11	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7606	ENL PERS DIN	AHU-2	11	18	5	11,329	168.3	0	0	$1,279	1	0	0	1	$348	$0	$11,721	33.68	0.27
7606	ENL PERS DIN	AHU-2	11	32	0	8,914	19.3	0	0	$448	0	3	0	11	$2,046	$0	$3,991	1.95	4.57
7606	ENL PERS DIN	AHU-2	11	33	0	413	18.8	0	0	$95	0	1	0	0	$272	$0	$890	3.27	2.87
7606	ENL PERS DIN	AHU-2	11	36	0	3,902	0.0	0	0	$161	0	0	0	2	$399	$0	$1,415	3.55	2.48
7606	ENL PERS DIN	AHU-2	11	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7606	ENL PERS DIN	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7606	ENL PERS DIN	CH-1	6	10	3	3,821	0.0	0	0	$229	1	0	1	0	$386	$0	$1,994	5.17	1.68
7606	ENL PERS DIN	CH-1	6	11	0	1,225	0.0	0	0	$51	0	0	0	2	$664	$0	$444	0.67	13.12
7606	ENL PERS DIN	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7606	ENL PERS DIN	CH-1	6	42	59	0	0.0	0	0	$1,501	1	0	0	0	$150	$0	$12,803	85.35	0.10
7606	ENL PERS DIN	CV-1	5	8	0	1,010	0.0	0	0	$42	1	0	1	0	$386	$0	$366	0.95	9.26
7606	ENL PERS DIN	CV-1	5	9	0	0	11.3	0	0	$47	0	1	0	3	$1,109	$0	$445	0.40	23.74
7606	ENL PERS DIN	HRU-1	17	19	0	8,712	146.1	0	0	$962	2	0	0	2	$697	$0	$8,894	12.76	0.72
7606	ENL PERS DIN	HRU-1	17	30	0	0	1.4	0	0	$6	0	1	0	3	$813	$0	$56	0.07	139.06
7606	ENL PERS DIN	HRU-2	17	19	0	3,002	73.0	0	0	$425	2	0	0	2	$697	$0	$3,956	5.68	1.64
7606	ENL PERS DIN	HRU-2	17	30	0	0	0.7	0	0	$3	0	1	0	3	$813	$0	$28	0.03	277.93
7608	ADMIN & SUPPORT BLDG	AHU-1	15	18	0	2,430	0.0	0	0	$109	1	0	0	1	$348	$0	$956	2.75	3.19
7608	ADMIN & SUPPORT BLDG	AHU-1	15	27	0	51	0.0	0	0	$2	0	2	0	3	$1,097	$0	$19	0.02	515.82
7608	ADMIN & SUPPORT BLDG	AHU-2	15	18	0	2,430	0.0	0	0	$109	1	0	0	1	$348	$0	$956	2.75	3.19
7608	ADMIN & SUPPORT BLDG	AHU-2	15	27	0	51	0.0	0	0	$2	0	2	0	3	$1,097	$0	$19	0.02	515.82
7608	ADMIN & SUPPORT BLDG	AHU-3	15	18	0	2,430	0.0	0	0	$109	1	0	0	1	$348	$0	$956	2.75	3.19
7608	ADMIN & SUPPORT BLDG	AHU-3	15	27	0	51	0.0	0	0	$2	0	2	0	3	$1,097	$0	$19	0.02	515.82
7608	ADMIN & SUPPORT BLDG	AHU-4	15	18	0	2,430	0.0	0	0	$109	1	0	0	1	$348	$0	$956	2.75	3.19
7608	ADMIN & SUPPORT BLDG	AHU-4	15	27	0	51	0.0	0	0	$2	0	2	0	3	$1,097	$0	$19	0.02	515.82
7608	ADMIN & SUPPORT BLDG	AHU-5	15	18	0	2,430	0.0	0	0	$109	1	0	0	1	$348	$0	$956	2.75	3.19
7608	ADMIN & SUPPORT BLDG	AHU-5	15	27	0	51	0.0	0	0	$2	0	2	0	3	$1,097	$0	$19	0.02	515.82
7608	ADMIN & SUPPORT BLDG	BLR-1	1	2	0	0	5.7	0	0	$23	0	0	0	3	$836	$0	$223	0.27	35.79
7608	ADMIN & SUPPORT BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7608	ADMIN & SUPPORT BLDG	CH-1	6	10	1	2,212	0.0	0	0	$108	1	0	1	0	$386	$0	$946	2.45	3.57
7608	ADMIN & SUPPORT BLDG	CH-1	6	11	0	263	0.0	0	0	$11	0	0	0	2	$664	$0	$95	0.14	61.25
7608	ADMIN & SUPPORT BLDG	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7608	ADMIN & SUPPORT BLDG	CH-1	6	42	13	0	0.0	0	0	$322	1	0	0	0	$150	$0	$2,743	18.29	0.47
7608	ADMIN & SUPPORT BLDG	RAD-1	25	23	0	1,773	0.0	3	0	$145	1	0	1	1	$570	$0	$1,257	2.21	3.93

7610	ENL BARRACKS W/AS	AHU-1	15	18	2	0	15.2	0	0	$107	1	0	0	1	$348	$0	$979	2.81	3.24
7610	ENL BARRACKS W/AS	AHU-1	15	27	0	1,705	25.8	0	0	$177	0	2	0	3	$1,097	$0	$1,630	1.49	6.21
7610	ENL BARRACKS W/AS	AHU-2	15	18	2	0	15.2	0	0	$107	1	0	0	1	$348	$0	$979	2.81	3.24
7610	ENL BARRACKS W/AS	AHU-2	15	27	0	1,705	25.8	0	0	$177	0	2	0	3	$1,097	$0	$1,630	1.49	6.21
7610	ENL BARRACKS W/AS	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18
7610	ENL BARRACKS W/AS	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7610	ENL BARRACKS W/AS	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7610	ENL BARRACKS W/AS	CH-1	6	10	1	0	0.0	0	0	$17	1	0	1	0	$386	$0	$143	0.37	22.96
7610	ENL BARRACKS W/AS	CH-1	6	11	0	1,050	0.0	0	0	$43	0	0	0	2	$664	$0	$381	0.57	15.31
7610	ENL BARRACKS W/AS	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7610	ENL BARRACKS W/AS	CH-1	6	42	50	0	0.0	0	0	$1,286	1	0	0	0	$150	$0	$10,974	73.16	0.12
7610	ENL BARRACKS W/AS	DTWP-1	24	22	4	0	0.0	3	0	$164	1	0	1	4	$1,418	$0	$1,398	0.99	8.65
7610	ENL BARRACKS W/AS	DTWP-2	24	22	2	0	0.0	3	0	$135	1	0	1	4	$1,418	$0	$1,151	0.81	10.51
7610	ENL BARRACKS W/AS	DTWP-3	24	22	2	0	0.0	3	0	$135	1	0	1	4	$1,418	$0	$1,151	0.81	10.51
7610	ENL BARRACKS W/AS	DTWP-4	24	22	0	0	0.0	3	0	$72	1	0	1	4	$1,418	$0	$614	0.43	19.69
7610	ENL BARRACKS W/AS	RAD-1	25	23	0	0	0.0	3	0	$72	1	0	1	1	$570	$0	$614	1.08	7.92
7612	ENL BARRACKS W/AS	AHU-1	15	18	2	0	15.2	0	0	$107	1	0	0	1	$348	$0	$979	2.81	3.24
7612	ENL BARRACKS W/AS	AHU-1	15	27	0	1,705	25.8	0	0	$177	0	2	0	3	$1,097	$0	$1,630	1.49	6.21
7612	ENL BARRACKS W/AS	AHU-2	15	18	2	0	15.2	0	0	$107	1	0	0	1	$348	$0	$979	2.81	3.24
7612	ENL BARRACKS W/AS	AHU-2	15	27	0	1,705	25.8	0	0	$177	0	2	0	3	$1,097	$0	$1,630	1.49	6.21
7612	ENL BARRACKS W/AS	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18
7612	ENL BARRACKS W/AS	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7612	ENL BARRACKS W/AS	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7612	ENL BARRACKS W/AS	CH-1	6	10	1	0	0.0	0	0	$24	1	0	1	0	$386	$0	$201	0.52	16.37
7612	ENL BARRACKS W/AS	CH-1	6	11	0	1,225	0.0	0	0	$51	0	0	0	2	$664	$0	$444	0.67	13.12
7612	ENL BARRACKS W/AS	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7612	ENL BARRACKS W/AS	CH-1	6	42	59	0	0.0	0	0	$1,501	1	0	0	0	$150	$0	$12,803	85.35	0.10
7612	ENL BARRACKS W/AS	DTWP-1	24	22	3	0	0.0	3	0	$152	1	0	1	4	$1,418	$0	$1,293	0.91	9.36
7612	ENL BARRACKS W/AS	DTWP-2	24	22	2	0	0.0	3	0	$135	1	0	1	4	$1,418	$0	$1,151	0.81	10.51
7612	ENL BARRACKS W/AS	DTWP-3	24	22	2	0	0.0	3	0	$135	1	0	1	4	$1,418	$0	$1,151	0.81	10.51
7612	ENL BARRACKS W/AS	DTWP-4	24	22	5	0	0.0	3	0	$190	1	0	1	4	$1,418	$0	$1,619	1.14	7.47
7612	ENL BARRACKS W/AS	RAD-1	25	23	0	0	0.0	3	0	$72	1	0	1	1	$570	$0	$614	1.08	7.92
7614	ENL BARRACKS W/AS	AHU-1	15	18	2	0	15.2	0	0	$107	1	0	0	1	$348	$0	$979	2.81	3.24
7614	ENL BARRACKS W/AS	AHU-1	15	27	0	1,705	25.8	0	0	$177	0	2	0	3	$1,097	$0	$1,630	1.49	6.21
7614	ENL BARRACKS W/AS	AHU-2	15	18	2	0	15.2	0	0	$107	1	0	0	1	$348	$0	$979	2.81	3.24
7614	ENL BARRACKS W/AS	AHU-2	15	27	0	1,705	25.8	0	0	$177	0	2	0	3	$1,097	$0	$1,630	1.49	6.21
7614	ENL BARRACKS W/AS	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18
7614	ENL BARRACKS W/AS	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7614	ENL BARRACKS W/AS	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7614	ENL BARRACKS W/AS	CH-1	6	10	1	0	0.0	0	0	$24	1	0	1	0	$386	$0	$201	0.52	16.37
7614	ENL BARRACKS W/AS	CH-1	6	11	0	1,225	0.0	0	0	$51	0	0	0	2	$664	$0	$444	0.67	13.12

7614	ENL BARRACKS W/AS	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7614	ENL BARRACKS W/AS	CH-1	6	42	59	0	0.0	0	0	$1,501	1	0	0	0	$150	$0	$12,803	85.35	0.10
7614	ENL BARRACKS W/AS	DTWP-1	24	22	4	0	0.0	3	0	$164	1	0	1	4	$1,418	$0	$1,398	0.99	8.65
7614	ENL BARRACKS W/AS	DTWP-2	24	22	3	0	0.0	3	0	$152	1	0	1	4	$1,418	$0	$1,293	0.91	9.36
7614	ENL BARRACKS W/AS	DTWP-3	24	22	3	0	0.0	3	0	$152	1	0	1	4	$1,418	$0	$1,293	0.91	9.36
7614	ENL BARRACKS W/AS	DTWP-4	24	22	5	0	0.0	3	0	$190	1	0	1	4	$1,418	$0	$1,619	1.14	7.47
7614	ENL BARRACKS W/AS	RAD-1	25	23	0	0	0.0	3	0	$72	1	0	1	1	$570	$0	$614	1.08	7.92
7616	ENL BARRACKS W/AS	AHU-1	15	18	2	0	15.2	0	0	$107	1	0	0	1	$348	$0	$979	2.81	3.24
7616	ENL BARRACKS W/AS	AHU-1	15	27	0	1,705	25.8	0	0	$177	0	2	0	3	$1,097	$0	$1,630	1.49	6.21
7616	ENL BARRACKS W/AS	AHU-2	15	18	2	0	15.2	0	0	$107	1	0	0	1	$348	$0	$979	2.81	3.24
7616	ENL BARRACKS W/AS	AHU-2	15	27	0	1,705	25.8	0	0	$177	0	2	0	3	$1,097	$0	$1,630	1.49	6.21
7616	ENL BARRACKS W/AS	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18
7616	ENL BARRACKS W/AS	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7616	ENL BARRACKS W/AS	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7616	ENL BARRACKS W/AS	CH-1	6	10	1	0	0.0	0	0	$24	1	0	1	0	$386	$0	$201	0.52	16.37
7616	ENL BARRACKS W/AS	CH-1	6	11	0	1,225	0.0	0	0	$51	0	0	0	2	$664	$0	$444	0.67	13.12
7616	ENL BARRACKS W/AS	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7616	ENL BARRACKS W/AS	CH-1	6	42	59	0	0.0	0	0	$1,501	1	0	0	0	$150	$0	$12,803	85.35	0.10
7616	ENL BARRACKS W/AS	DTWP-1	24	22	4	0	0.0	3	0	$164	1	0	1	4	$1,418	$0	$1,398	0.99	8.65
7616	ENL BARRACKS W/AS	DTWP-2	24	22	3	0	0.0	3	0	$152	1	0	1	4	$1,418	$0	$1,293	0.91	9.36
7616	ENL BARRACKS W/AS	DTWP-3	24	22	7	0	0.0	3	0	$262	1	0	1	4	$1,418	$0	$2,236	1.58	5.41
7616	ENL BARRACKS W/AS	DTWP-4	24	22	5	0	0.0	3	0	$190	1	0	1	4	$1,418	$0	$1,619	1.14	7.47
7616	ENL BARRACKS W/AS	RAD-1	25	23	0	0	0.0	3	0	$72	1	0	1	1	$570	$0	$614	1.08	7.92
7618	ENL BARRACKS W/O DIN	AHU-1	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7618	ENL BARRACKS W/O DIN	AHU-1	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7618	ENL BARRACKS W/O DIN	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7618	ENL BARRACKS W/O DIN	AHU-2	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7618	ENL BARRACKS W/O DIN	AHU-2	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7618	ENL BARRACKS W/O DIN	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7618	ENL BARRACKS W/O DIN	AHU-3	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7618	ENL BARRACKS W/O DIN	AHU-3	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7618	ENL BARRACKS W/O DIN	AHU-3	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7618	ENL BARRACKS W/O DIN	AHU-4	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7618	ENL BARRACKS W/O DIN	AHU-4	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7618	ENL BARRACKS W/O DIN	AHU-4	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7618	ENL BARRACKS W/O DIN	AHU-5	10	18	11	0	50.8	0	0	$489	1	0	0	1	$348	$0	$4,382	12.59	0.71
7618	ENL BARRACKS W/O DIN	AHU-5	10	29	0	3,361	86.1	0	0	$493	0	7	0	8	$3,378	$0	$4,598	1.36	6.85
7618	ENL BARRACKS W/O DIN	AHU-5	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7618	ENL BARRACKS W/O DIN	AHU-6	10	18	11	0	50.8	0	0	$489	1	0	0	1	$348	$0	$4,382	12.59	0.71
7618	ENL BARRACKS W/O DIN	AHU-6	10	29	0	3,361	86.1	0	0	$493	0	7	0	8	$3,378	$0	$4,598	1.36	6.85
7618	ENL BARRACKS W/O DIN	AHU-6	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93

[illegible]	[illegible]	[illegible]	TYPE	[illegible]	[illegible]	SVGS. PER YR	SVGS PER YR	HOUR SVGS PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	DG PNT	AG PNT	PNT	PNT	CONSTR. COST	[illegible]	[illegible]	[illegible]	BACK
7618	ENL BARRACKS W/O DIN	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18
7618	ENL BARRACKS W/O DIN	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7618	ENL BARRACKS W/O DIN	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7618	ENL BARRACKS W/O DIN	CH-1	6	10	2	0	0.0	0	0	$44	1	0	1	0	$386	$0	$377	0.98	8.74
7618	ENL BARRACKS W/O DIN	CH-1	6	11	0	1,292	0.0	0	0	$53	0	0	0	2	$664	$0	$468	0.71	12.45
7618	ENL BARRACKS W/O DIN	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7618	ENL BARRACKS W/O DIN	CH-1	6	42	62	0	0.0	0	0	$1,582	1	0	0	0	$150	$0	$13,498	89.98	0.09
7620	BN ADMIN & CLRM	AHU-1	10	18	7	65,743	346.8	0	0	$4,334	1	0	0	1	$348	$0	$39,078	112.29	0.08
7620	BN ADMIN & CLRM	AHU-1	10	29	0	3,603	73.1	0	0	$450	0	7	0	8	$3,378	$0	$4,175	1.24	7.51
7620	BN ADMIN & CLRM	AHU-1	10	33	0	198	12.5	0	0	$60	0	1	0	0	$272	$0	$561	2.06	4.57
7620	BN ADMIN & CLRM	AHU-1	10	35	0	1,229	0.0	0	0	$51	0	0	0	2	$399	$0	$446	1.12	7.86
7620	BN ADMIN & CLRM	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7620	BN ADMIN & CLRM	BLR-1	1	1	0	3,602	0.0	0	0	$149	2	0	0	0	$277	$0	$1,306	4.72	1.86
7620	BN ADMIN & CLRM	BLR-1	1	2	0	0	2.6	0	0	$11	0	0	0	3	$836	$0	$100	0.12	79.53
7620	BN ADMIN & CLRM	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7620	BN ADMIN & CLRM	CH-1	8	17	17	359	0.0	3	0	$526	1	0	1	0	$243	$0	$4,494	18.49	0.46
7622	BN ADMIN & CLRM	AHU-1	10	18	3	30,768	95.6	0	0	$1,744	1	0	0	1	$348	$0	$15,590	44.80	0.20
7622	BN ADMIN & CLRM	AHU-1	10	29	0	2,828	20.4	0	0	$201	0	7	0	8	$3,378	$0	$1,827	0.54	16.81
7622	BN ADMIN & CLRM	AHU-1	10	33	0	61	3.8	0	0	$18	0	1	0	0	$272	$0	$173	0.63	14.86
7622	BN ADMIN & CLRM	AHU-1	10	35	0	965	0.0	0	0	$40	0	0	0	2	$399	$0	$350	0.88	10.01
7622	BN ADMIN & CLRM	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7622	BN ADMIN & CLRM	AHU-2	10	18	3	30,483	111.0	0	0	$1,796	1	0	0	1	$348	$0	$16,092	46.24	0.19
7622	BN ADMIN & CLRM	AHU-2	10	29	0	2,755	20.4	0	0	$198	0	7	0	8	$3,378	$0	$1,801	0.53	17.07
7622	BN ADMIN & CLRM	AHU-2	10	33	0	74	4.7	0	0	$22	0	1	0	0	$272	$0	$210	0.77	12.20
7622	BN ADMIN & CLRM	AHU-2	10	35	0	940	0.0	0	0	$39	0	0	0	2	$399	$0	$341	0.85	10.28
7622	BN ADMIN & CLRM	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7622	BN ADMIN & CLRM	AHU-3	10	18	7	56,107	141.4	0	0	$3,090	1	0	0	1	$348	$0	$27,520	79.08	0.11
7622	BN ADMIN & CLRM	AHU-3	10	29	0	4,487	24.0	0	0	$284	0	7	0	8	$3,378	$0	$2,568	0.76	11.89
7622	BN ADMIN & CLRM	AHU-3	10	33	0	96	6.1	0	0	$29	0	1	0	0	$272	$0	$274	1.01	9.36
7622	BN ADMIN & CLRM	AHU-3	10	35	0	1,531	0.0	0	0	$63	0	0	0	2	$399	$0	$555	1.39	6.31
7622	BN ADMIN & CLRM	AHU-3	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7622	BN ADMIN & CLRM	BLR-1	1	1	0	5,755	0.0	0	0	$238	2	0	0	0	$277	$0	$2,087	7.53	1.17
7622	BN ADMIN & CLRM	BLR-1	1	2	0	0	5.1	0	0	$21	0	0	0	3	$836	$0	$200	0.24	39.76
7622	BN ADMIN & CLRM	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7622	BN ADMIN & CLRM	CH-1	6	10	2	5,587	0.0	0	0	$275	1	0	1	0	$386	$0	$2,403	6.22	1.40
7622	BN ADMIN & CLRM	CH-1	6	11	0	788	0.0	0	0	$33	0	0	0	2	$664	$0	$286	0.43	20.42
7622	BN ADMIN & CLRM	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7622	BN ADMIN & CLRM	CH-1	6	42	38	0	0.0	0	0	$965	1	0	0	0	$150	$0	$8,230	54.87	0.16
7624	BN ADMIN & CLRM	AHU-1	10	18	11	100,889	178.5	0	0	$5,182	1	0	0	1	$348	$0	$45,980	132.13	0.07
7624	BN ADMIN & CLRM	AHU-1	10	29	0	5,660	31.8	0	0	$365	0	7	0	8	$3,378	$0	$3,301	0.98	9.26
7624	BN ADMIN & CLRM	AHU-1	10	33	0	105	6.7	0	0	$32	0	1	0	0	$272	$0	$299	1.10	8.57

BLDG NO	BUILDING TYPE	EQUIP TAG	SYS TYPE	ECO REF NUMBER	KW SVGS. PER YR	KWH SVGS. PER YR	MBTU SVGS. PER YR	LABOR HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL CONSTR COST	RECUR COSTS PER YR	TOTAL DISC SAVINGS	SIR	SIMPLE PAYBACK
7624	BN ADMIN & CLRM	AHU-1	10	35	0	1,931	0.0	0	0	$80	0	0	0	2	$399	$0	$700	1.76	5.00
7624	BN ADMIN & CLRM	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7624	BN ADMIN & CLRM	BLR-1	1	1	0	2,876	0.0	0	0	$119	2	0	0	0	$277	$0	$1,043	3.77	2.33
7624	BN ADMIN & CLRM	BLR-1	1	2	0	0	2.2	0	0	$9	0	0	0	3	$836	$0	$86	0.10	92.47
7624	BN ADMIN & CLRM	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7624	BN ADMIN & CLRM	CH-1	8	17	25	525	0.0	3	0	$737	1	0	1	0	$243	$0	$6,291	25.89	0.33
7626	CLINIC W/O BEDS	AHU-1	10	18	0	18,257	251.1	0	0	$1,788	1	0	0	1	$348	$0	$16,478	47.35	0.19
7626	CLINIC W/O BEDS	AHU-1	10	29	0	902	48.2	0	0	$236	0	7	0	8	$3,378	$0	$2,221	0.66	14.32
7626	CLINIC W/O BEDS	AHU-1	10	33	0	238	9.9	0	0	$51	0	1	0	0	$272	$0	$475	1.75	5.38
7626	CLINIC W/O BEDS	AHU-1	10	35	0	2,365	0.0	0	0	$98	0	0	0	2	$399	$0	$857	2.15	4.09
7626	CLINIC W/O BEDS	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7626	CLINIC W/O BEDS	BLR-1	1	1	0	1,917	0.0	0	0	$79	2	0	0	0	$277	$0	$695	2.51	3.50
7626	CLINIC W/O BEDS	BLR-1	1	2	0	0	1.5	0	0	$6	0	0	0	3	$836	$0	$57	0.07	138.71
7626	CLINIC W/O BEDS	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7626	CLINIC W/O BEDS	CH-1	6	10	1	4,231	0.0	0	0	$205	1	0	1	0	$386	$0	$1,789	4.63	1.89
7626	CLINIC W/O BEDS	CH-1	6	11	0	186	0.0	0	0	$8	0	0	0	2	$664	$0	$67	0.10	86.67
7626	CLINIC W/O BEDS	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7626	CLINIC W/O BEDS	CH-1	6	42	9	0	0.0	0	0	$227	1	0	0	0	$150	$0	$1,939	12.92	0.66
7630	BN ADMIN & CLRM	AHU-1	10	18	11	96,854	172.8	0	0	$4,992	1	0	0	1	$348	$0	$44,294	127.28	0.07
7630	BN ADMIN & CLRM	AHU-1	10	29	0	6,289	31.8	0	0	$391	0	7	0	8	$3,378	$0	$3,529	1.04	8.65
7630	BN ADMIN & CLRM	AHU-1	10	33	0	105	6.7	0	0	$32	0	1	0	0	$272	$0	$299	1.10	8.57
7630	BN ADMIN & CLRM	AHU-1	10	35	0	2,146	0.0	0	0	$89	0	0	0	2	$399	$0	$778	1.95	4.50
7630	BN ADMIN & CLRM	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7630	BN ADMIN & CLRM	BLR-1	1	1	0	2,768	0.0	0	0	$114	2	0	0	0	$277	$0	$1,004	3.62	2.42
7630	BN ADMIN & CLRM	BLR-1	1	2	0	0	2.2	0	0	$9	0	0	0	3	$836	$0	$86	0.10	92.47
7630	BN ADMIN & CLRM	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7630	BN ADMIN & CLRM	CH-1	8	17	25	525	0.0	3	0	$737	1	0	1	0	$243	$0	$6,291	25.89	0.33
7632	GYMNASIUM	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7632	GYMNASIUM	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7632	GYMNASIUM	FC-1	16	18	0	296	155.3	0	0	$652	1	0	0	1	$348	$0	$6,205	17.83	0.53
7632	GYMNASIUM	FC-1	16	30	0	0	1.5	0	0	$6	0	1	0	3	$813	$0	$58	0.07	133.28
7632	GYMNASIUM	FC-2	16	18	0	296	155.3	0	0	$652	1	0	0	1	$348	$0	$6,205	17.83	0.53
7632	GYMNASIUM	FC-2	16	30	0	0	1.5	0	0	$6	0	1	0	3	$813	$0	$58	0.07	133.28
7632	GYMNASIUM	HV-1	16	18	0	3,195	857.4	0	0	$3,664	1	0	0	1	$348	$0	$34,823	100.07	0.09
7632	GYMNASIUM	HV-1	16	30	0	0	5.3	0	0	$22	0	1	0	3	$813	$0	$209	0.26	37.02
7632	GYMNASIUM	HV-2	16	18	0	3,195	857.4	0	0	$3,664	1	0	0	1	$348	$0	$34,823	100.07	0.09
7632	GYMNASIUM	HV-2	16	30	0	0	5.3	0	0	$22	0	1	0	3	$813	$0	$209	0.26	37.02
7632	GYMNASIUM	HV-3	16	18	0	3,195	857.4	0	0	$3,664	1	0	0	1	$348	$0	$34,823	100.07	0.09
7632	GYMNASIUM	HV-3	16	30	0	0	5.3	0	0	$22	0	1	0	3	$813	$0	$209	0.26	37.02
7632	GYMNASIUM	HV-4	16	18	0	3,195	857.4	0	0	$3,664	1	0	0	1	$348	$0	$34,823	100.07	0.09
7632	GYMNASIUM	HV-4	16	30	0	0	5.3	0	0	$22	0	1	0	3	$813	$0	$209	0.26	37.02

7632	GYMNASIUM	HV-5	16	18	0	3,195	857.4	0	0	$3,664	1	0	0	1	$348	$0	$34,823	100.07	0.09
7632	GYMNASIUM	HV-5	16	30	0	0	5.3	0	0	$22	0	1	0	3	$813	$0	$209	0.26	37.02
7636	REGIMENTAL HQ BLDG	AHU-1	15	18	1	9,752	98.6	0	0	$832	1	0	0	1	$348	$0	$7,607	21.86	0.42
7636	REGIMENTAL HQ BLDG	AHU-1	15	27	0	401	7.7	0	0	$48	0	2	0	3	$1,097	$0	$448	0.41	22.69
7636	REGIMENTAL HQ BLDG	AHU-1	15	36	0	137	0.0	0	0	$6	0	0	0	2	$399	$0	$50	0.12	70.62
7636	REGIMENTAL HQ BLDG	BLR-1	1	1	0	1,990	0.0	0	0	$82	2	0	0	0	$277	$0	$722	2.60	3.37
7636	REGIMENTAL HQ BLDG	BLR-1	1	2	0	0	2.6	0	0	$11	0	0	0	3	$836	$0	$100	0.12	79.53
7636	REGIMENTAL HQ BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7636	REGIMENTAL HQ BLDG	CH-1	6	10	3	10,477	0.0	0	0	$504	1	0	1	0	$386	$0	$4,407	11.42	0.77
7636	REGIMENTAL HQ BLDG	CH-1	6	11	0	522	0.0	0	0	$22	0	0	0	2	$664	$0	$189	0.28	30.83
7636	REGIMENTAL HQ BLDG	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7636	REGIMENTAL HQ BLDG	CH-1	6	42	25	0	0.0	0	0	$639	1	0	0	0	$150	$0	$5,450	36.34	0.23
7636	REGIMENTAL HQ BLDG	FC-1	19	20	0	21,166	22.3	0	0	$966	1	0	1	2	$1,213	$0	$8,553	7.05	1.26
7636	REGIMENTAL HQ BLDG	RAD-1	25	23	0	1,773	0.0	3	0	$145	1	0	1	1	$570	$0	$1,257	2.21	3.93
7638	BN ADMIN & CLRM	AHU-1	10	18	11	96,854	172.8	0	0	$4,992	1	0	0	1	$348	$0	$44,294	127.28	0.07
7638	BN ADMIN & CLRM	AHU-1	10	29	0	6,289	31.8	0	0	$391	0	7	0	8	$3,378	$0	$3,529	1.04	8.65
7638	BN ADMIN & CLRM	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7638	BN ADMIN & CLRM	BLR-1	1	1	0	1,845	0.0	0	0	$76	2	0	0	0	$277	$0	$669	2.42	3.64
7638	BN ADMIN & CLRM	BLR-1	1	2	0	0	2.2	0	0	$9	0	0	0	3	$836	$0	$86	0.10	92.47
7638	BN ADMIN & CLRM	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7638	BN ADMIN & CLRM	CH-1	8	17	25	525	0.0	3	0	$737	1	0	1	0	$243	$0	$6,291	25.89	0.33
7642	ENL BARRACKS W/O DIN	AHU-1	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7642	ENL BARRACKS W/O DIN	AHU-1	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7642	ENL BARRACKS W/O DIN	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7642	ENL BARRACKS W/O DIN	AHU-2	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7642	ENL BARRACKS W/O DIN	AHU-2	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7642	ENL BARRACKS W/O DIN	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7642	ENL BARRACKS W/O DIN	AHU-3	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7642	ENL BARRACKS W/O DIN	AHU-3	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7642	ENL BARRACKS W/O DIN	AHU-3	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7642	ENL BARRACKS W/O DIN	AHU-4	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7642	ENL BARRACKS W/O DIN	AHU-4	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7642	ENL BARRACKS W/O DIN	AHU-4	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7642	ENL BARRACKS W/O DIN	AHU-5	10	18	11	0	50.8	0	0	$489	1	0	0	1	$348	$0	$4,382	12.59	0.71
7642	ENL BARRACKS W/O DIN	AHU-5	10	29	0	3,361	86.1	0	0	$493	0	7	0	8	$3,378	$0	$4,598	1.36	6.85
7642	ENL BARRACKS W/O DIN	AHU-5	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7642	ENL BARRACKS W/O DIN	AHU-6	10	18	11	0	50.8	0	0	$489	1	0	0	1	$348	$0	$4,382	12.59	0.71
7642	ENL BARRACKS W/O DIN	AHU-6	10	29	0	3,361	86.1	0	0	$493	0	7	0	8	$3,378	$0	$4,598	1.36	6.85
7642	ENL BARRACKS W/O DIN	AHU-6	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7642	ENL BARRACKS W/O DIN	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18
7642	ENL BARRACKS W/O DIN	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44

BLDG NO	BLDG NAME	EQUIP TAG ID	SYSTEM TYPE	EMCS FUNCTN NUMBER	KW SVGS. PER YR	KWH SVGS. PER YR	MBTU SVGS. PER YR	LABOR HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL CONSTR COST	RECUR COSTS PER YR	TOTAL DISC SAVINGS	SIR	SIMPLE PAYBACK
7642	ENL BARRACKS W/O DIN	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7642	ENL BARRACKS W/O DIN	CH-1	6	10	1	0	0.0	0	0	$30	1	0	1	0	$386	$0	$254	0.66	12.94
7642	ENL BARRACKS W/O DIN	CH-1	6	11	0	1,292	0.0	0	0	$53	0	0	0	2	$664	$0	$468	0.71	12.45
7642	ENL BARRACKS W/O DIN	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7642	ENL BARRACKS W/O DIN	CH-1	6	42	62	0	0.0	0	0	$1,582	1	0	0	0	$150	$0	$13,498	89.98	0.09
7644	ENL BARRACKS W/O DIN	AHU-1	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7644	ENL BARRACKS W/O DIN	AHU-1	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7644	ENL BARRACKS W/O DIN	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7644	ENL BARRACKS W/O DIN	AHU-2	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7644	ENL BARRACKS W/O DIN	AHU-2	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7644	ENL BARRACKS W/O DIN	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7644	ENL BARRACKS W/O DIN	AHU-3	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7644	ENL BARRACKS W/O DIN	AHU-3	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7644	ENL BARRACKS W/O DIN	AHU-3	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7644	ENL BARRACKS W/O DIN	AHU-4	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7644	ENL BARRACKS W/O DIN	AHU-4	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7644	ENL BARRACKS W/O DIN	AHU-4	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7644	ENL BARRACKS W/O DIN	AHU-5	10	18	11	0	50.8	0	0	$489	1	0	0	1	$348	$0	$4,382	12.59	0.71
7644	ENL BARRACKS W/O DIN	AHU-5	10	29	0	3,361	86.1	0	0	$493	0	7	0	8	$3,378	$0	$4,598	1.36	6.85
7644	ENL BARRACKS W/O DIN	AHU-5	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7644	ENL BARRACKS W/O DIN	AHU-6	10	18	11	0	50.8	0	0	$489	1	0	0	1	$348	$0	$4,382	12.59	0.71
7644	ENL BARRACKS W/O DIN	AHU-6	10	29	0	3,361	86.1	0	0	$493	0	7	0	8	$3,378	$0	$4,598	1.36	6.85
7644	ENL BARRACKS W/O DIN	AHU-6	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7644	ENL BARRACKS W/O DIN	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18
7644	ENL BARRACKS W/O DIN	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7644	ENL BARRACKS W/O DIN	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7644	ENL BARRACKS W/O DIN	CH-1	6	10	2	0	0.0	0	0	$44	1	0	1	0	$386	$0	$377	0.98	8.74
7644	ENL BARRACKS W/O DIN	CH-1	6	11	0	1,292	0.0	0	0	$53	0	0	0	2	$664	$0	$468	0.71	12.45
7644	ENL BARRACKS W/O DIN	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7644	ENL BARRACKS W/O DIN	CH-1	6	42	62	0	0.0	0	0	$1,582	1	0	0	0	$150	$0	$13,498	89.98	0.09
7646	ENL BARRACKS W/O DIN	AHU-1	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7646	ENL BARRACKS W/O DIN	AHU-1	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7646	ENL BARRACKS W/O DIN	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7646	ENL BARRACKS W/O DIN	AHU-2	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7646	ENL BARRACKS W/O DIN	AHU-2	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7646	ENL BARRACKS W/O DIN	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7646	ENL BARRACKS W/O DIN	AHU-3	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7646	ENL BARRACKS W/O DIN	AHU-3	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7646	ENL BARRACKS W/O DIN	AHU-3	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7646	ENL BARRACKS W/O DIN	AHU-4	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7646	ENL BARRACKS W/O DIN	AHU-4	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41

7646	ENL BARRACKS W/O DIN	AHU-4	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7646	ENL BARRACKS W/O DIN	AHU-5	10	18	11	0	50.8	0	0	$489	1	0	0	1	$348	$0	$4,382	12.59	0.71
7646	ENL BARRACKS W/O DIN	AHU-5	10	29	0	3,361	86.1	0	0	$493	0	7	0	8	$3,378	$0	$4,598	1.36	6.85
7646	ENL BARRACKS W/O DIN	AHU-5	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7646	ENL BARRACKS W/O DIN	AHU-6	10	18	11	0	50.8	0	0	$489	1	0	0	1	$348	$0	$4,382	12.59	0.71
7646	ENL BARRACKS W/O DIN	AHU-6	10	29	0	3,361	86.1	0	0	$493	0	7	0	8	$3,378	$0	$4,598	1.36	6.85
7646	ENL BARRACKS W/O DIN	AHU-6	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7646	ENL BARRACKS W/O DIN	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18
7646	ENL BARRACKS W/O DIN	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7646	ENL BARRACKS W/O DIN	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7646	ENL BARRACKS W/O DIN	CH-1	6	10	2	0	0.0	0	0	$44	1	0	1	0	$386	$0	$377	0.98	8.74
7646	ENL BARRACKS W/O DIN	CH-1	6	11	0	1,470	0.0	0	0	$61	0	0	0	2	$664	$0	$533	0.80	10.94
7646	ENL BARRACKS W/O DIN	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7646	ENL BARRACKS W/O DIN	CH-1	6	42	71	0	0.0	0	0	$1,801	1	0	0	0	$150	$0	$15,363	102.42	0.08
7648	ENL BARRACKS W/O DIN	AHU-1	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7648	ENL BARRACKS W/O DIN	AHU-1	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7648	ENL BARRACKS W/O DIN	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7648	ENL BARRACKS W/O DIN	AHU-2	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7648	ENL BARRACKS W/O DIN	AHU-2	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7648	ENL BARRACKS W/O DIN	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7648	ENL BARRACKS W/O DIN	AHU-3	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7648	ENL BARRACKS W/O DIN	AHU-3	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7648	ENL BARRACKS W/O DIN	AHU-3	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7648	ENL BARRACKS W/O DIN	AHU-4	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7648	ENL BARRACKS W/O DIN	AHU-4	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7648	ENL BARRACKS W/O DIN	AHU-4	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7648	ENL BARRACKS W/O DIN	AHU-5	10	18	14	0	50.8	0	0	$571	1	0	0	1	$348	$0	$5,078	14.59	0.61
7648	ENL BARRACKS W/O DIN	AHU-5	10	29	0	3,361	86.1	0	0	$493	0	7	0	8	$3,378	$0	$4,598	1.36	6.85
7648	ENL BARRACKS W/O DIN	AHU-5	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7648	ENL BARRACKS W/O DIN	AHU-6	10	18	14	0	50.8	0	0	$571	1	0	0	1	$348	$0	$5,078	14.59	0.61
7648	ENL BARRACKS W/O DIN	AHU-6	10	29	0	3,361	86.1	0	0	$493	0	7	0	8	$3,378	$0	$4,598	1.36	6.85
7648	ENL BARRACKS W/O DIN	AHU-6	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7648	ENL BARRACKS W/O DIN	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18
7648	ENL BARRACKS W/O DIN	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7648	ENL BARRACKS W/O DIN	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7648	ENL BARRACKS W/O DIN	CH-1	6	10	2	0	0.0	0	0	$44	1	0	1	0	$386	$0	$377	0.98	8.74
7648	ENL BARRACKS W/O DIN	CH-1	6	11	0	1,470	0.0	0	0	$61	0	0	0	2	$664	$0	$533	0.80	10.94
7648	ENL BARRACKS W/O DIN	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7648	ENL BARRACKS W/O DIN	CH-1	6	42	71	0	0.0	0	0	$1,801	1	0	0	0	$150	$0	$15,363	102.42	0.08
7648	ENL BARRACKS W/O DIN	HWP-1	26	24	0	0	0.0	3	0	$72	1	0	1	0	$386	$0	$614	1.59	5.36
7648	ENL BARRACKS W/O DIN	HWP-2	26	24	0	0	0.0	3	0	$72	1	0	1	0	$386	$0	$614	1.59	5.36

7648	ENL BARRACKS W/O DIN	HWP-3	26	24	0	0	0.0	3	0	$72	1	0	1	0	$386	$0	$614	1.59	5.36
7650	ENL BARRACKS W/O DIN	AHU-1	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7650	ENL BARRACKS W/O DIN	AHU-1	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7650	ENL BARRACKS W/O DIN	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7650	ENL BARRACKS W/O DIN	AHU-2	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7650	ENL BARRACKS W/O DIN	AHU-2	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7650	ENL BARRACKS W/O DIN	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7650	ENL BARRACKS W/O DIN	AHU-3	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7650	ENL BARRACKS W/O DIN	AHU-3	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7650	ENL BARRACKS W/O DIN	AHU-3	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7650	ENL BARRACKS W/O DIN	AHU-4	10	18	7	0	50.8	0	0	$399	1	0	0	1	$348	$0	$3,615	10.39	0.87
7650	ENL BARRACKS W/O DIN	AHU-4	10	29	0	2,457	86.1	0	0	$456	0	7	0	8	$3,378	$0	$4,270	1.26	7.41
7650	ENL BARRACKS W/O DIN	AHU-4	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7650	ENL BARRACKS W/O DIN	AHU-5	10	18	14	0	50.8	0	0	$571	1	0	0	1	$348	$0	$5,078	14.59	0.61
7650	ENL BARRACKS W/O DIN	AHU-5	10	29	0	3,361	86.1	0	0	$493	0	7	0	8	$3,378	$0	$4,598	1.36	6.85
7650	ENL BARRACKS W/O DIN	AHU-5	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7650	ENL BARRACKS W/O DIN	AHU-6	10	18	14	0	50.8	0	0	$571	1	0	0	1	$348	$0	$5,078	14.59	0.61
7650	ENL BARRACKS W/O DIN	AHU-6	10	29	0	3,361	86.1	0	0	$493	0	7	0	8	$3,378	$0	$4,598	1.36	6.85
7650	ENL BARRACKS W/O DIN	AHU-6	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7650	ENL BARRACKS W/O DIN	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18
7650	ENL BARRACKS W/O DIN	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7650	ENL BARRACKS W/O DIN	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7650	ENL BARRACKS W/O DIN	CH-1	6	10	2	0	0.0	0	0	$44	1	0	1	0	$386	$0	$377	0.98	8.74
7650	ENL BARRACKS W/O DIN	CH-1	6	11	0	1,292	0.0	0	0	$53	0	0	0	2	$664	$0	$468	0.71	12.45
7650	ENL BARRACKS W/O DIN	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7650	ENL BARRACKS W/O DIN	CH-1	6	42	62	0	0.0	0	0	$1,582	1	0	0	0	$150	$0	$13,498	89.98	0.09
7652	ADMIN & SUPPORT BLDG	AHU-1	15	18	1	2,886	0.0	0	0	$132	1	0	0	1	$348	$0	$1,159	3.33	2.63
7652	ADMIN & SUPPORT BLDG	AHU-1	15	27	0	56	0.0	0	0	$2	0	2	0	3	$1,097	$0	$20	0.02	472.84
7652	ADMIN & SUPPORT BLDG	AHU-2	15	18	1	2,886	0.0	0	0	$132	1	0	0	1	$348	$0	$1,159	3.33	2.63
7652	ADMIN & SUPPORT BLDG	AHU-2	15	27	0	56	0.0	0	0	$2	0	2	0	3	$1,097	$0	$20	0.02	472.84
7652	ADMIN & SUPPORT BLDG	AHU-3	15	18	1	2,886	0.0	0	0	$132	1	0	0	1	$348	$0	$1,159	3.33	2.63
7652	ADMIN & SUPPORT BLDG	AHU-3	15	27	0	56	0.0	0	0	$2	0	2	0	3	$1,097	$0	$20	0.02	472.84
7652	ADMIN & SUPPORT BLDG	AHU-4	15	18	1	2,886	0.0	0	0	$132	1	0	0	1	$348	$0	$1,159	3.33	2.63
7652	ADMIN & SUPPORT BLDG	AHU-4	15	27	0	56	0.0	0	0	$2	0	2	0	3	$1,097	$0	$20	0.02	472.84
7652	ADMIN & SUPPORT BLDG	AHU-5	15	18	1	2,886	0.0	0	0	$132	1	0	0	1	$348	$0	$1,159	3.33	2.63
7652	ADMIN & SUPPORT BLDG	AHU-5	15	27	0	56	0.0	0	0	$2	0	2	0	3	$1,097	$0	$20	0.02	472.84
7652	ADMIN & SUPPORT BLDG	BLR-1	1	2	0	0	5.7	0	0	$23	0	0	0	3	$836	$0	$223	0.27	35.79
7652	ADMIN & SUPPORT BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7652	ADMIN & SUPPORT BLDG	CH-1	6	10	1	2,982	0.0	0	0	$147	1	0	1	0	$386	$0	$1,282	3.32	2.63
7652	ADMIN & SUPPORT BLDG	CH-1	6	11	0	263	0.0	0	0	$11	0	0	0	2	$664	$0	$95	0.14	61.25
7652	ADMIN & SUPPORT BLDG	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93

7652	ADMIN & SUPPORT BLDG	CH-1	6	42	13	0	0.0	0	0	$322	1	0	0	0	$150	$0	$2,743	18.29	0.47
7652	ADMIN & SUPPORT BLDG	RAD-1	25	23	0	2,551	0.0	3	0	$177	1	0	1	1	$570	$0	$1,539	2.70	3.21
7654	ENL PERS DIN	AHU-1	11	18	7	14,219	164.2	0	0	$1,454	1	0	0	1	$348	$0	$13,224	38.00	0.24
7654	ENL PERS DIN	AHU-1	11	32	0	8,607	19.3	0	0	$435	0	3	0	11	$2,046	$0	$3,880	1.90	4.70
7654	ENL PERS DIN	AHU-1	11	33	0	399	18.2	0	0	$91	0	1	0	0	$272	$0	$859	3.16	2.98
7654	ENL PERS DIN	AHU-1	11	36	0	3,768	0.0	0	0	$156	0	0	0	2	$399	$0	$1,366	3.42	2.56
7654	ENL PERS DIN	AHU-1	11	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7654	ENL PERS DIN	AHU-2	11	18	7	14,435	168.3	0	0	$1,480	1	0	0	1	$348	$0	$13,464	38.69	0.24
7654	ENL PERS DIN	AHU-2	11	32	0	8,914	19.3	0	0	$448	0	3	0	11	$2,046	$0	$3,991	1.95	4.57
7654	ENL PERS DIN	AHU-2	11	33	0	413	18.8	0	0	$95	0	1	0	0	$272	$0	$890	3.27	2.87
7654	ENL PERS DIN	AHU-2	11	36	0	3,902	0.0	0	0	$161	0	0	0	2	$399	$0	$1,415	3.55	2.48
7654	ENL PERS DIN	AHU-2	11	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7654	ENL PERS DIN	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7654	ENL PERS DIN	CH-1	6	10	3	3,821	0.0	0	0	$229	1	0	1	0	$386	$0	$1,994	5.17	1.68
7654	ENL PERS DIN	CH-1	6	11	0	1,243	0.0	0	0	$51	0	0	0	2	$664	$0	$451	0.68	12.94
7654	ENL PERS DIN	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7654	ENL PERS DIN	CH-1	6	42	60	0	0.0	0	0	$1,522	1	0	0	0	$150	$0	$12,986	86.57	0.10
7654	ENL PERS DIN	CV-1	5	8	0	1,801	0.0	0	0	$74	1	0	1	0	$386	$0	$653	1.69	5.19
7654	ENL PERS DIN	HRU-1	17	19	0	13,073	146.1	0	0	$1,142	2	0	0	2	$697	$0	$10,475	15.03	0.61
7654	ENL PERS DIN	HRU-1	17	30	0	0	0.7	0	0	$3	0	1	0	3	$813	$0	$28	0.03	277.93
7654	ENL PERS DIN	HRU-2	17	19	0	4,505	146.1	0	0	$788	2	0	0	2	$697	$0	$7,368	10.57	0.88
7654	ENL PERS DIN	HRU-2	17	30	0	0	1.4	0	0	$6	0	1	0	3	$813	$0	$56	0.07	139.06
7656	GEN INST BLDG	AHU-1	10	18	7	27,164	166.4	0	0	$1,998	1	0	0	1	$348	$0	$18,005	51.74	0.17
7656	GEN INST BLDG	AHU-1	10	29	0	2,415	58.1	0	0	$339	0	7	0	8	$3,378	$0	$3,155	0.93	9.97
7656	GEN INST BLDG	AHU-1	10	33	0	0	6.8	0	0	$28	0	1	0	0	$272	$0	$265	0.98	9.77
7656	GEN INST BLDG	AHU-1	10	35	0	2,060	0.0	0	0	$85	0	0	0	2	$399	$0	$747	1.87	4.69
7656	GEN INST BLDG	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7656	GEN INST BLDG	AHU-2	10	18	7	27,164	166.4	0	0	$1,998	1	0	0	1	$348	$0	$18,005	51.74	0.17
7656	GEN INST BLDG	AHU-2	10	29	0	2,415	58.1	0	0	$339	0	7	0	8	$3,378	$0	$3,155	0.93	9.97
7656	GEN INST BLDG	AHU-2	10	33	0	0	6.8	0	0	$28	0	1	0	0	$272	$0	$265	0.98	9.77
7656	GEN INST BLDG	AHU-2	10	35	0	2,060	0.0	0	0	$85	0	0	0	2	$399	$0	$747	1.87	4.69
7656	GEN INST BLDG	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7656	GEN INST BLDG	BLR-1	1	1	0	5,247	0.0	0	0	$217	2	0	0	0	$277	$0	$1,903	6.87	1.28
7656	GEN INST BLDG	BLR-1	1	2	0	0	46.9	0	0	$193	0	0	0	3	$836	$0	$1,840	2.20	4.33
7656	GEN INST BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7656	GEN INST BLDG	CH-1	6	10	2	5,043	0.0	0	0	$252	1	0	1	0	$386	$0	$2,205	5.71	1.53
7656	GEN INST BLDG	CH-1	6	11	0	1,292	0.0	0	0	$53	0	0	0	2	$664	$0	$468	0.71	12.45
7656	GEN INST BLDG	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7656	GEN INST BLDG	CH-1	6	42	62	0	0.0	0	0	$1,582	1	0	0	0	$150	$0	$13,498	89.98	0.09
7656	GEN INST BLDG	HWP-1	26	24	0	4,776	0.0	3	0	$269	1	0	1	0	$386	$0	$2,346	6.08	1.43
7658	ADMIN & SUPPORT BLDG	AHU-1	15	18	1	2,886	163.7	0	0	$807	1	0	0	1	$348	$0	$7,588	21.80	0.43

BLDG NO	BLDG NAME	EQUIP TAG	SYS TYPE	[illegible] FUNCTN NUMBER	KW SVGS. PER YR	KWH SVGS. PER YR	MBtu SVGS PER YR	LABOR HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	DDC PNT	AO PNT	DI PNT	AI PNT	TOTAL CONSTR COST	[illegible] PER YR	TOTAL DISC SAVINGS	[illegible]	[illegible] PAYBACK
7658	ADMIN & SUPPORT BLDG	AHU-1	15	27	0	56	0.0	0	0	$2	0	2	0	3	$1,097	$0	$20	0.02	472.84
7658	ADMIN & SUPPORT BLDG	AHU-2	15	18	1	2,886	0.0	0	0	$132	1	0	0	1	$348	$0	$1,159	3.33	2.63
7658	ADMIN & SUPPORT BLDG	AHU-2	15	27	0	56	0.0	0	0	$2	0	2	0	3	$1,097	$0	$20	0.02	472.84
7658	ADMIN & SUPPORT BLDG	AHU-3	15	18	1	2,886	0.0	0	0	$132	1	0	0	1	$348	$0	$1,159	3.33	2.63
7658	ADMIN & SUPPORT BLDG	AHU-3	15	27	0	56	0.0	0	0	$2	0	2	0	3	$1,097	$0	$20	0.02	472.84
7658	ADMIN & SUPPORT BLDG	AHU-4	15	18	1	2,886	0.0	0	0	$132	1	0	0	1	$348	$0	$1,159	3.33	2.63
7658	ADMIN & SUPPORT BLDG	AHU-4	15	27	0	56	0.0	0	0	$2	0	2	0	3	$1,097	$0	$20	0.02	472.84
7658	ADMIN & SUPPORT BLDG	AHU-5	15	18	1	2,886	0.0	0	0	$132	1	0	0	1	$348	$0	$1,159	3.33	2.63
7658	ADMIN & SUPPORT BLDG	AHU-5	15	27	0	56	0.0	0	0	$2	0	2	0	3	$1,097	$0	$20	0.02	472.84
7658	ADMIN & SUPPORT BLDG	BLR-1	1	2	0	0	5.7	0	0	$23	0	0	0	3	$836	$0	$223	0.27	35.79
7658	ADMIN & SUPPORT BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7658	ADMIN & SUPPORT BLDG	CH-1	6	10	1	2,982	0.0	0	0	$147	1	0	1	0	$386	$0	$1,282	3.32	2.63
7658	ADMIN & SUPPORT BLDG	CH-1	6	11	0	263	0.0	0	0	$11	0	0	0	2	$664	$0	$95	0.14	61.25
7658	ADMIN & SUPPORT BLDG	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7658	ADMIN & SUPPORT BLDG	CH-1	6	42	13	0	0.0	0	0	$322	1	0	0	0	$150	$0	$2,743	18.29	0.47
7658	ADMIN & SUPPORT BLDG	RAD-1	25	23	0	2,551	0.0	3	0	$177	1	0	1	1	$570	$0	$1,539	2.70	3.21
7665	DENTAL CLINIC	AHU-1	10	18	0	98,354	767.8	0	0	$7,225	1	0	0	1	$348	$0	$65,811	189.11	0.05
7665	DENTAL CLINIC	AHU-1	10	29	0	6,050	185.3	0	0	$1,013	0	7	0	8	$3,378	$0	$9,468	2.80	3.33
7665	DENTAL CLINIC	AHU-1	10	33	0	720	29.9	0	0	$153	0	1	0	0	$272	$0	$1,433	5.27	1.78
7665	DENTAL CLINIC	AHU-1	10	35	0	15,862	0.0	0	0	$655	0	0	0	2	$399	$0	$5,752	14.42	0.61
7665	DENTAL CLINIC	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7665	DENTAL CLINIC	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7665	DENTAL CLINIC	CH-1	6	10	3	9,746	0.0	0	0	$474	1	0	1	0	$386	$0	$4,142	10.73	0.81
7665	DENTAL CLINIC	CH-1	6	11	0	875	0.0	0	0	$36	0	0	0	2	$664	$0	$317	0.48	18.37
7665	DENTAL CLINIC	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7665	DENTAL CLINIC	CH-1	6	42	42	0	0.0	0	0	$1,072	1	0	0	0	$150	$0	$9,145	60.97	0.14
7670	DENTAL CLINIC	AHU-1	18	19	0	76,051	1,008.2	0	0	$7,295	2	0	0	2	$697	$0	$67,163	96.36	0.10
7670	DENTAL CLINIC	AHU-1	18	28	0	7,882	250.2	0	0	$1,356	1	7	0	9	$3,761	$0	$12,683	3.37	2.77
7670	DENTAL CLINIC	AHU-1	18	34	0	938	38.9	0	0	$199	0	1	0	0	$272	$0	$1,867	6.86	1.37
7670	DENTAL CLINIC	AHU-1	18	37	0	20,665	0.0	0	0	$853	0	0	0	2	$399	$0	$7,493	18.78	0.47
7670	DENTAL CLINIC	AHU-1	18	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7670	DENTAL CLINIC	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7670	DENTAL CLINIC	CH-1	6	10	1	4,078	0.0	0	0	$198	1	0	1	0	$386	$0	$1,733	4.49	1.95
7670	DENTAL CLINIC	CH-1	6	11	0	1,453	0.0	0	0	$60	0	0	0	2	$664	$0	$527	0.79	11.07
7670	DENTAL CLINIC	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7670	DENTAL CLINIC	CH-1	6	42	70	0	0.0	0	0	$1,780	1	0	0	0	$150	$0	$15,180	101.20	0.08
7670	DENTAL CLINIC	CV-1	5	8	0	1,845	0.0	0	0	$76	1	0	1	0	$386	$0	$669	1.73	5.07
7720	VEH MNT SHOP ORG	AHU-1	15	18	0	3,685	64.1	0	0	$416	1	0	0	1	$348	$0	$3,852	11.07	0.84
7720	VEH MNT SHOP ORG	AHU-1	15	27	0	0	27.6	0	0	$114	0	2	0	3	$1,097	$0	$1,083	0.99	9.65
7720	VEH MNT SHOP ORG	AHU-2	15	18	0	1,932	45.8	0	0	$268	1	0	0	1	$348	$0	$2,498	7.18	1.30
7720	VEH MNT SHOP ORG	AHU-2	15	27	0	0	19.7	0	0	$81	0	2	0	3	$1,097	$0	$774	0.71	13.51

7720	VEH MNT SHOP ORG	AHU-3	15	18	0	1,932	45.8	0	0	$268	1	0	0	1	$348	$0	$2,498	7.18	1.30
7720	VEH MNT SHOP ORG	AHU-3	15	27	0	0	19.7	0	0	$81	0	2	0	3	$1,097	$0	$774	0.71	13.51
7720	VEH MNT SHOP ORG	AHU-4	15	18	0	1,932	45.8	0	0	$268	1	0	0	1	$348	$0	$2,498	7.18	1.30
7720	VEH MNT SHOP ORG	AHU-4	15	27	0	0	19.7	0	0	$81	0	2	0	3	$1,097	$0	$774	0.71	13.51
7720	VEH MNT SHOP ORG	AHU-5	15	18	0	1,932	54.9	0	0	$306	1	0	0	1	$348	$0	$2,857	8.21	1.14
7720	VEH MNT SHOP ORG	AHU-5	15	27	0	0	23.6	0	0	$97	0	2	0	3	$1,097	$0	$928	0.85	11.26
7720	VEH MNT SHOP ORG	AHU-6	15	18	0	5,169	119.0	0	0	$704	1	0	0	1	$348	$0	$6,547	18.81	0.49
7720	VEH MNT SHOP ORG	AHU-6	15	27	0	0	51.2	0	0	$211	0	2	0	3	$1,097	$0	$2,012	1.83	5.20
7720	VEH MNT SHOP ORG	MAU-1	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29
7720	VEH MNT SHOP ORG	MAU-1	16	30	0	0	31.5	0	0	$130	0	1	0	3	$813	$0	$1,235	1.52	6.27
7720	VEH MNT SHOP ORG	MAU-2	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29
7720	VEH MNT SHOP ORG	MAU-2	16	30	0	0	31.5	0	0	$130	0	1	0	3	$813	$0	$1,235	1.52	6.27
7720	VEH MNT SHOP ORG	MAU-3	16	18	0	23,016	0.0	0	0	$951	1	0	0	1	$348	$0	$8,346	23.98	0.37
7720	VEH MNT SHOP ORG	MAU-3	16	30	0	0	62.9	0	0	$259	0	1	0	3	$813	$0	$2,470	3.04	3.14
7720	VEH MNT SHOP ORG	RAD-1	20	20	0	1,932	219.7	0	0	$985	1	0	1	2	$1,213	$0	$9,326	7.69	1.23
7720	VEH MNT SHOP ORG	RAD-2	20	20	0	1,295	146.5	0	0	$657	1	0	1	2	$1,213	$0	$6,220	5.13	1.85
7739	MVNG TRGT SIM BLDG	AHU-1	10	18	0	41,138	241.4	0	0	$2,693	1	0	0	1	$348	$0	$24,395	70.10	0.13
7739	MVNG TRGT SIM BLDG	AHU-1	10	29	0	2,022	62.0	0	0	$339	0	7	0	8	$3,378	$0	$3,170	0.94	9.96
7739	MVNG TRGT SIM BLDG	AHU-1	10	33	0	109	5.7	0	0	$28	0	1	0	0	$272	$0	$262	0.96	9.75
7739	MVNG TRGT SIM BLDG	AHU-1	10	35	0	4,658	0.0	0	0	$192	0	0	0	2	$399	$0	$1,689	4.23	2.07
7739	MVNG TRGT SIM BLDG	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7739	MVNG TRGT SIM BLDG	BLR-1	1	1	0	320	0.0	0	0	$13	2	0	0	0	$277	$0	$116	0.42	20.99
7739	MVNG TRGT SIM BLDG	BLR-1	1	2	0	0	2.2	0	0	$9	0	0	0	3	$836	$0	$86	0.10	92.95
7739	MVNG TRGT SIM BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7739	MVNG TRGT SIM BLDG	CH-1	8	17	17	350	0.0	3	0	$515	1	0	1	0	$243	$0	$4,399	18.10	0.47
7739	MVNG TRGT SIM BLDG	RAD-1	25	23	0	320	0.0	3	0	$85	1	0	1	1	$570	$0	$730	1.28	6.69
7760	VEH MNT SHOP ORG	AHU-1	15	18	0	3,244	54.7	0	0	$359	1	0	0	1	$348	$0	$3,323	9.55	0.97
7760	VEH MNT SHOP ORG	AHU-1	15	27	0	0	23.5	0	0	$97	0	2	0	3	$1,097	$0	$924	0.84	11.31
7760	VEH MNT SHOP ORG	AHU-2	15	18	0	1,700	39.1	0	0	$231	1	0	0	1	$348	$0	$2,150	6.18	1.51
7760	VEH MNT SHOP ORG	AHU-2	15	27	0	0	16.8	0	0	$69	0	2	0	3	$1,097	$0	$660	0.60	15.83
7760	VEH MNT SHOP ORG	AHU-3	15	18	0	1,700	39.1	0	0	$231	1	0	0	1	$348	$0	$2,150	6.18	1.51
7760	VEH MNT SHOP ORG	AHU-3	15	27	0	0	16.8	0	0	$69	0	2	0	3	$1,097	$0	$660	0.60	15.83
7760	VEH MNT SHOP ORG	AHU-4	15	18	0	1,700	39.1	0	0	$231	1	0	0	1	$348	$0	$2,150	6.18	1.51
7760	VEH MNT SHOP ORG	AHU-4	15	27	0	0	16.8	0	0	$69	0	2	0	3	$1,097	$0	$660	0.60	15.83
7760	VEH MNT SHOP ORG	AHU-5	15	18	0	1,700	46.9	0	0	$263	1	0	0	1	$348	$0	$2,457	7.06	1.32
7760	VEH MNT SHOP ORG	AHU-5	15	27	0	0	20.2	0	0	$83	0	2	0	3	$1,097	$0	$792	0.72	13.19
7760	VEH MNT SHOP ORG	AHU-6	15	18	0	4,550	101.6	0	0	$606	1	0	0	1	$348	$0	$5,638	16.20	0.57
7760	VEH MNT SHOP ORG	AHU-6	15	27	0	0	43.7	0	0	$180	0	2	0	3	$1,097	$0	$1,717	1.57	6.09
7760	VEH MNT SHOP ORG	MAU-1	16	18	0	5,755	0.0	0	0	$238	1	0	0	1	$348	$0	$2,087	6.00	1.46
7760	VEH MNT SHOP ORG	MAU-1	16	30	0	0	26.8	0	0	$111	0	1	0	3	$813	$0	$1,054	1.30	7.35
7760	VEH MNT SHOP ORG	MAU-2	16	18	0	5,755	0.0	0	0	$238	1	0	0	1	$348	$0	$2,087	6.00	1.46

NO.			TYPE			SVGS. PER YR	KWH SVGS PER YR	DEM SVGS PER YR	LABOR HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	DO PNT	AO PNT	DI PNT	AI PNT	CONSTR COST		SAVINGS		
7760	VEH MNT SHOP ORG	MAU-2	16	30	0	0	26.8	0	0	$111	0	1	0	3	$813	$0	$1,054	1.30	7.35
7760	VEH MNT SHOP ORG	MAU-3	16	18	0	20,258	0.0	0	0	$837	1	0	0	1	$348	$0	$7,346	21.11	0.42
7760	VEH MNT SHOP ORG	MAU-3	16	30	0	0	53.7	0	0	$221	0	1	0	3	$813	$0	$2,108	2.59	3.68
7760	VEH MNT SHOP ORG	RAD-1	20	20	0	1,700	187.5	0	0	$843	1	0	1	2	$1,213	$0	$7,979	6.58	1.44
7760	VEH MNT SHOP ORG	RAD-2	20	20	0	1,140	125.0	0	0	$562	1	0	1	2	$1,213	$0	$5,321	4.39	2.16
7780	VEH MNT SHOP ORG	AHU-1	15	18	0	3,685	49.3	0	0	$355	1	0	0	1	$348	$0	$3,271	9.40	0.98
7780	VEH MNT SHOP ORG	AHU-1	15	27	0	0	21.2	0	0	$87	0	2	0	3	$1,097	$0	$833	0.76	12.55
7780	VEH MNT SHOP ORG	AHU-2	15	18	0	1,932	35.2	0	0	$225	1	0	0	1	$348	$0	$2,082	5.98	1.55
7780	VEH MNT SHOP ORG	AHU-2	15	27	0	0	15.1	0	0	$62	0	2	0	3	$1,097	$0	$595	0.54	17.58
7780	VEH MNT SHOP ORG	AHU-3	15	18	0	1,932	35.2	0	0	$225	1	0	0	1	$348	$0	$2,082	5.98	1.55
7780	VEH MNT SHOP ORG	AHU-3	15	27	0	0	15.1	0	0	$62	0	2	0	3	$1,097	$0	$595	0.54	17.58
7780	VEH MNT SHOP ORG	AHU-4	15	18	0	1,932	35.2	0	0	$225	1	0	0	1	$348	$0	$2,082	5.98	1.55
7780	VEH MNT SHOP ORG	AHU-4	15	27	0	0	15.1	0	0	$62	0	2	0	3	$1,097	$0	$595	0.54	17.58
7780	VEH MNT SHOP ORG	AHU-5	15	18	0	1,932	42.2	0	0	$254	1	0	0	1	$348	$0	$2,358	6.78	1.37
7780	VEH MNT SHOP ORG	AHU-5	15	27	0	0	18.2	0	0	$75	0	2	0	3	$1,097	$0	$714	0.65	14.65
7780	VEH MNT SHOP ORG	AHU-6	15	18	0	5,169	91.5	0	0	$590	1	0	0	1	$348	$0	$5,467	15.71	0.59
7780	VEH MNT SHOP ORG	AHU-6	15	27	0	0	39.4	0	0	$162	0	2	0	3	$1,097	$0	$1,547	1.41	6.76
7780	VEH MNT SHOP ORG	MAU-1	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29
7780	VEH MNT SHOP ORG	MAU-1	16	30	0	0	24.2	0	0	$100	0	1	0	3	$813	$0	$949	1.17	8.16
7780	VEH MNT SHOP ORG	MAU-2	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29
7780	VEH MNT SHOP ORG	MAU-2	16	30	0	0	24.2	0	0	$100	0	1	0	3	$813	$0	$949	1.17	8.16
7780	VEH MNT SHOP ORG	MAU-3	16	18	0	23,016	0.0	0	0	$951	1	0	0	1	$348	$0	$8,346	23.98	0.37
7780	VEH MNT SHOP ORG	MAU-3	16	30	0	0	48.4	0	0	$199	0	1	0	3	$813	$0	$1,899	2.34	4.08
7780	VEH MNT SHOP ORG	RAD-1	20	20	0	1,932	168.9	0	0	$776	1	0	1	2	$1,213	$0	$7,332	6.04	1.56
7780	VEH MNT SHOP ORG	RAD-2	20	20	0	1,295	112.6	0	0	$517	1	0	1	2	$1,213	$0	$4,891	4.03	2.34
7802	ADMIN & SUPPORT BLDG	BLR	1	2	0	0	0.0	0	0	$0	0	0	0	3	$836	$0	$0	0.00	37,155.56
7802	ADMIN & SUPPORT BLDG	BLR	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7802	ADMIN & SUPPORT BLDG	CH-1	6	11	0	252	0.0	0	0	$10	0	0	0	2	$664	$0	$91	0.14	63.80
7802	ADMIN & SUPPORT BLDG	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7802	ADMIN & SUPPORT BLDG	CH-1	6	42	12	0	0.0	0	0	$309	1	0	0	0	$150	$0	$2,634	17.56	0.49
7802	ADMIN & SUPPORT BLDG	FC-1	19	20	0	15,216	160.8	0	0	$1,291	1	0	1	2	$1,213	$0	$11,832	9.75	0.94
7802	ADMIN & SUPPORT BLDG	RAD-1	25	23	0	2,876	0.0	3	0	$191	1	0	1	1	$570	$0	$1,657	2.91	2.99
7804	ENL PERS DIN	AHU-1	15	18	7	14,219	164.2	0	0	$1,454	1	0	0	1	$348	$0	$13,224	38.00	0.24
7804	ENL PERS DIN	AHU-1	15	27	0	8,607	19.3	0	0	$435	0	2	0	3	$1,097	$0	$3,880	3.54	2.52
7804	ENL PERS DIN	AHU-1	15	33	0	399	18.2	0	0	$91	0	1	0	0	$272	$0	$859	3.16	2.98
7804	ENL PERS DIN	AHU-1	15	36	0	3,768	0.0	0	0	$156	0	0	0	2	$399	$0	$1,366	3.42	2.56
7804	ENL PERS DIN	AHU-2	15	18	7	14,435	168.3	0	0	$1,480	1	0	0	1	$348	$0	$13,464	38.69	0.24
7804	ENL PERS DIN	AHU-2	15	27	0	8,914	19.3	0	0	$448	0	2	0	3	$1,097	$0	$3,991	3.64	2.45
7804	ENL PERS DIN	AHU-2	15	33	0	413	18.8	0	0	$95	0	1	0	0	$272	$0	$890	3.27	2.87
7804	ENL PERS DIN	AHU-2	15	36	0	3,902	0.0	0	0	$161	0	0	0	2	$399	$0	$1,415	3.55	2.48
7804	ENL PERS DIN	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57

[illegible]	[illegible]	[illegible]	TYPE	[illegible]	KW SVGS PER YR	KWH SVGS PER YR	MBtu SVGS PER YR	[illegible] SVGS PER YR	[illegible] SVGS PER YR	COST SVGS PER YR	[illegible] PNT	[illegible] PNT	[illegible] PNT	[illegible] PNT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7804	ENL PERS DIN	CH-1	6	10	3	3,821	0.0	0	0	$229	1	0	1	0	$386	$0	$1,994	5.17	1.68
7804	ENL PERS DIN	CH-1	6	11	0	1,292	0.0	0	0	$53	0	0	0	2	$664	$0	$468	0.71	12.45
7804	ENL PERS DIN	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7804	ENL PERS DIN	CH-1	6	42	62	0	0.0	0	0	$1,582	1	0	0	0	$150	$0	$13,498	89.98	0.09
7804	ENL PERS DIN	CV-1	5	8	0	1,801	0.0	0	0	$74	1	0	1	0	$386	$0	$653	1.69	5.19
7804	ENL PERS DIN	CV-1	5	9	0	0	12.5	0	0	$51	0	1	0	3	$1,109	$0	$490	0.44	21.58
7804	ENL PERS DIN	HV-1	16	18	0	5,445	486.9	0	0	$2,231	1	0	0	1	$348	$0	$21,091	60.61	0.16
7804	ENL PERS DIN	HV-1	16	30	0	0	4.7	0	0	$19	0	1	0	3	$813	$0	$186	0.23	41.71
7804	ENL PERS DIN	HV-2	16	18	0	1,801	243.4	0	0	$1,077	1	0	0	1	$348	$0	$10,211	29.34	0.32
7804	ENL PERS DIN	HV-2	16	30	0	0	2.4	0	0	$10	0	1	0	3	$813	$0	$93	0.11	83.41
7806	BN HQ BLDG	AHU-1	15	18	5	40,886	37.6	0	0	$1,961	1	0	0	1	$348	$0	$17,309	49.74	0.18
7806	BN HQ BLDG	AHU-1	15	27	0	5,832	31.0	0	0	$368	0	2	0	3	$1,097	$0	$3,330	3.04	2.98
7806	BN HQ BLDG	AHU-2	15	18	5	41,798	37.6	0	0	$1,999	1	0	0	1	$348	$0	$17,639	50.69	0.17
7806	BN HQ BLDG	AHU-2	15	27	0	6,014	31.0	0	0	$376	0	2	0	3	$1,097	$0	$3,396	3.10	2.92
7806	BN HQ BLDG	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7806	BN HQ BLDG	CH-1	6	10	3	7,917	0.0	0	0	$398	1	0	1	0	$386	$0	$3,479	9.01	0.97
7806	BN HQ BLDG	CH-1	6	11	0	1,292	0.0	0	0	$53	0	0	0	2	$664	$0	$468	0.71	12.45
7806	BN HQ BLDG	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7806	BN HQ BLDG	CH-1	6	42	62	0	0.0	0	0	$1,582	1	0	0	0	$150	$0	$13,498	89.98	0.09
7806	BN HQ BLDG	CV-1	5	9	0	0	4.7	0	0	$19	0	1	0	3	$1,109	$0	$185	0.17	57.20
7806	BN HQ BLDG	RAD-1	25	23	0	2,225	0.0	3	0	$164	1	0	1	1	$570	$0	$1,421	2.49	3.48
7808	ADMIN & SUPPORT BLDG	BLR-1	1	2	0	0	3.0	0	0	$12	0	0	0	3	$836	$0	$118	0.14	67.78
7808	ADMIN & SUPPORT BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7808	ADMIN & SUPPORT BLDG	CH-1	6	11	0	252	0.0	0	0	$10	0	0	0	2	$664	$0	$91	0.14	63.80
7808	ADMIN & SUPPORT BLDG	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7808	ADMIN & SUPPORT BLDG	CH-1	6	42	12	0	0.0	0	0	$309	1	0	0	0	$150	$0	$2,634	17.56	0.49
7808	ADMIN & SUPPORT BLDG	DTWP-1	24	22	1	4,592	0.0	3	0	$297	1	0	1	4	$1,418	$0	$2,580	1.82	4.78
7808	ADMIN & SUPPORT BLDG	FC-1	19	20	0	15,337	160.8	0	0	$1,296	1	0	1	2	$1,213	$0	$11,876	9.79	0.94
7808	ADMIN & SUPPORT BLDG	RAD-1	25	23	0	2,898	0.0	3	0	$192	1	0	1	1	$570	$0	$1,665	2.92	2.97
7810	ENL BARRACKS W/O DIN	AHU-1	15	18	2	0	15.2	0	0	$107	1	0	0	1	$348	$0	$979	2.81	3.24
7810	ENL BARRACKS W/O DIN	AHU-1	15	27	0	1,705	25.7	0	0	$176	0	2	0	3	$1,097	$0	$1,629	1.48	6.22
7810	ENL BARRACKS W/O DIN	AHU-2	15	18	2	0	15.2	0	0	$107	1	0	0	1	$348	$0	$979	2.81	3.24
7810	ENL BARRACKS W/O DIN	AHU-2	15	27	0	1,705	25.7	0	0	$176	0	2	0	3	$1,097	$0	$1,629	1.48	6.22
7810	ENL BARRACKS W/O DIN	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18
7810	ENL BARRACKS W/O DIN	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7810	ENL BARRACKS W/O DIN	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7810	ENL BARRACKS W/O DIN	CH-1	6	10	1	0	0.0	0	0	$24	1	0	1	0	$386	$0	$201	0.52	16.37
7810	ENL BARRACKS W/O DIN	CH-1	6	11	0	1,225	0.0	0	0	$51	0	0	0	2	$664	$0	$444	0.67	13.12
7810	ENL BARRACKS W/O DIN	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7810	ENL BARRACKS W/O DIN	CH-1	6	42	59	0	0.0	0	0	$1,501	1	0	0	0	$150	$0	$12,803	85.35	0.10
7810	ENL BARRACKS W/O DIN	DTWP-1	24	22	4	0	0.0	3	0	$164	1	0	1	4	$1,418	$0	$1,398	0.99	8.65

7810	ENL BARRACKS W/O DIN	DTWP-2	24	22	3	0	0.0	3	0	$152	1	0	1	4	$1,418	$0	$1,293	0.91	9.36
7810	ENL BARRACKS W/O DIN	DTWP-3	24	22	3	0	0.0	3	0	$152	1	0	1	4	$1,418	$0	$1,293	0.91	9.36
7810	ENL BARRACKS W/O DIN	DTWP-4	24	22	5	0	0.0	3	0	$190	1	0	1	4	$1,418	$0	$1,619	1.14	7.47
7810	ENL BARRACKS W/O DIN	RAD-1	25	23	0	0	0.0	3	0	$72	1	0	1	1	$570	$0	$614	1.08	7.92
7812	ENL BARRACKS W/O DIN	AHU-1	15	18	2	0	15.2	0	0	$107	1	0	0	1	$348	$0	$979	2.81	3.24
7812	ENL BARRACKS W/O DIN	AHU-1	15	27	0	1,705	25.7	0	0	$176	0	2	0	3	$1,097	$0	$1,629	1.48	6.22
7812	ENL BARRACKS W/O DIN	AHU-2	15	18	2	0	15.2	0	0	$107	1	0	0	1	$348	$0	$979	2.81	3.24
7812	ENL BARRACKS W/O DIN	AHU-2	15	27	0	1,705	25.7	0	0	$176	0	2	0	3	$1,097	$0	$1,629	1.48	6.22
7812	ENL BARRACKS W/O DIN	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18
7812	ENL BARRACKS W/O DIN	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7812	ENL BARRACKS W/O DIN	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7812	ENL BARRACKS W/O DIN	CH-1	6	10	1	0	0.0	0	0	$24	1	0	1	0	$386	$0	$201	0.52	16.37
7812	ENL BARRACKS W/O DIN	CH-1	6	11	0	1,286	0.0	0	0	$53	0	0	0	2	$664	$0	$466	0.70	12.50
7812	ENL BARRACKS W/O DIN	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7812	ENL BARRACKS W/O DIN	CH-1	6	42	62	0	0.0	0	0	$1,576	1	0	0	0	$150	$0	$13,443	89.62	0.10
7812	ENL BARRACKS W/O DIN	DTWP-1	24	22	4	0	0.0	3	0	$164	1	0	1	4	$1,418	$0	$1,398	0.99	8.65
7812	ENL BARRACKS W/O DIN	DTWP-2	24	22	3	0	0.0	3	0	$152	1	0	1	4	$1,418	$0	$1,293	0.91	9.36
7812	ENL BARRACKS W/O DIN	DTWP-3	24	22	3	0	0.0	3	0	$152	1	0	1	4	$1,418	$0	$1,293	0.91	9.36
7812	ENL BARRACKS W/O DIN	DTWP-4	24	22	5	0	0.0	3	0	$190	1	0	1	4	$1,418	$0	$1,619	1.14	7.47
7812	ENL BARRACKS W/O DIN	RAD-1	25	23	0	0	0.0	3	0	$72	1	0	1	1	$570	$0	$614	1.08	7.92
7814	ENL BARRACKS W/O DIN	AHU-1	15	18	2	0	15.2	0	0	$107	1	0	0	1	$348	$0	$979	2.81	3.24
7814	ENL BARRACKS W/O DIN	AHU-1	15	27	0	1,705	25.7	0	0	$176	0	2	0	3	$1,097	$0	$1,629	1.48	6.22
7814	ENL BARRACKS W/O DIN	AHU-2	15	18	2	0	15.2	0	0	$107	1	0	0	1	$348	$0	$979	2.81	3.24
7814	ENL BARRACKS W/O DIN	AHU-2	15	27	0	1,705	25.7	0	0	$176	0	2	0	3	$1,097	$0	$1,629	1.48	6.22
7814	ENL BARRACKS W/O DIN	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18
7814	ENL BARRACKS W/O DIN	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7814	ENL BARRACKS W/O DIN	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7814	ENL BARRACKS W/O DIN	CH-1	6	10	1	0	0.0	0	0	$24	1	0	1	0	$386	$0	$201	0.52	16.37
7814	ENL BARRACKS W/O DIN	CH-1	6	11	0	1,225	0.0	0	0	$51	0	0	0	2	$664	$0	$444	0.67	13.12
7814	ENL BARRACKS W/O DIN	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7814	ENL BARRACKS W/O DIN	CH-1	6	42	59	0	0.0	0	0	$1,501	1	0	0	0	$150	$0	$12,803	85.35	0.10
7814	ENL BARRACKS W/O DIN	DTWP-1	24	22	4	0	0.0	3	0	$164	1	0	1	4	$1,418	$0	$1,398	0.99	8.65
7814	ENL BARRACKS W/O DIN	DTWP-2	24	22	3	0	0.0	3	0	$152	1	0	1	4	$1,418	$0	$1,293	0.91	9.36
7814	ENL BARRACKS W/O DIN	DTWP-3	24	22	3	0	0.0	3	0	$152	1	0	1	4	$1,418	$0	$1,293	0.91	9.36
7814	ENL BARRACKS W/O DIN	DTWP-4	24	22	5	0	0.0	3	0	$190	1	0	1	4	$1,418	$0	$1,619	1.14	7.47
7814	ENL BARRACKS W/O DIN	RAD-1	25	23	0	0	0.0	3	0	$72	1	0	1	1	$570	$0	$614	1.08	7.92
7816	ENL BARRACKS W/O DIN	AHU-1	15	18	2	0	15.2	0	0	$107	1	0	0	1	$348	$0	$979	2.81	3.24
7816	ENL BARRACKS W/O DIN	AHU-1	15	27	0	1,705	25.7	0	0	$176	0	2	0	3	$1,097	$0	$1,629	1.48	6.22
7816	ENL BARRACKS W/O DIN	AHU-2	15	18	2	0	15.2	0	0	$107	1	0	0	1	$348	$0	$979	2.81	3.24
7816	ENL BARRACKS W/O DIN	AHU-2	15	27	0	1,705	25.7	0	0	$176	0	2	0	3	$1,097	$0	$1,629	1.48	6.22
7816	ENL BARRACKS W/O DIN	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18

[illegible]	[illegible]	[illegible]	SYS TYPE	NUMBER	KW SVGS PER YR	KWH SVGS PER YR	SVGS PER YR	LABOR HOUR SVGS PER YR	MATRL $ SVGS PER YR	COST SVGS PER YR	PNT	PNT	PNT	PNT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7816	ENL BARRACKS W/O DIN	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7816	ENL BARRACKS W/O DIN	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7816	ENL BARRACKS W/O DIN	CH-1	6	10	1	0	0.0	0	0	$24	1	0	1	0	$386	$0	$201	0.52	16.37
7816	ENL BARRACKS W/O DIN	CH-1	6	11	0	1,286	0.0	0	0	$53	0	0	0	2	$664	$0	$466	0.70	12.50
7816	ENL BARRACKS W/O DIN	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7816	ENL BARRACKS W/O DIN	CH-1	6	42	62	0	0.0	0	0	$1,576	1	0	0	0	$150	$0	$13,443	89.62	0.10
7816	ENL BARRACKS W/O DIN	DTWP-1	24	22	4	0	0.0	3	0	$164	1	0	1	4	$1,418	$0	$1,398	0.99	8.65
7816	ENL BARRACKS W/O DIN	DTWP-2	24	22	3	0	0.0	3	0	$152	1	0	1	4	$1,418	$0	$1,293	0.91	9.36
7816	ENL BARRACKS W/O DIN	DTWP-3	24	22	3	0	0.0	3	0	$152	1	0	1	4	$1,418	$0	$1,293	0.91	9.36
7816	ENL BARRACKS W/O DIN	DTWP-4	24	22	5	0	0.0	3	0	$190	1	0	1	4	$1,418	$0	$1,619	1.14	7.47
7816	ENL BARRACKS W/O DIN	RAD-1	25	23	0	0	0.0	3	0	$72	1	0	1	1	$570	$0	$614	1.08	7.92
7818	ENL BARRACKS W/O DIN	AHU-1	15	18	3	0	15.2	0	0	$142	1	0	0	1	$348	$0	$1,275	3.66	2.45
7818	ENL BARRACKS W/O DIN	AHU-1	15	27	0	1,705	25.7	0	0	$176	0	2	0	3	$1,097	$0	$1,629	1.48	6.22
7818	ENL BARRACKS W/O DIN	AHU-2	15	18	2	0	15.2	0	0	$107	1	0	0	1	$348	$0	$979	2.81	3.24
7818	ENL BARRACKS W/O DIN	AHU-2	15	27	0	1,705	25.7	0	0	$176	0	2	0	3	$1,097	$0	$1,629	1.48	6.22
7818	ENL BARRACKS W/O DIN	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18
7818	ENL BARRACKS W/O DIN	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7818	ENL BARRACKS W/O DIN	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7818	ENL BARRACKS W/O DIN	CH-1	6	10	1	0	0.0	0	0	$24	1	0	1	0	$386	$0	$201	0.52	16.37
7818	ENL BARRACKS W/O DIN	CH-1	6	11	0	1,292	0.0	0	0	$53	0	0	0	2	$664	$0	$468	0.71	12.45
7818	ENL BARRACKS W/O DIN	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7818	ENL BARRACKS W/O DIN	CH-1	6	42	62	0	0.0	0	0	$1,582	1	0	0	0	$150	$0	$13,498	89.98	0.09
7818	ENL BARRACKS W/O DIN	DTWP-1	24	22	4	0	0.0	3	0	$164	1	0	1	4	$1,418	$0	$1,398	0.99	8.65
7818	ENL BARRACKS W/O DIN	DTWP-2	24	22	5	0	0.0	3	0	$190	1	0	1	4	$1,418	$0	$1,619	1.14	7.47
7818	ENL BARRACKS W/O DIN	DTWP-3	24	22	5	0	0.0	3	0	$190	1	0	1	4	$1,418	$0	$1,619	1.14	7.47
7818	ENL BARRACKS W/O DIN	DTWP-4	24	22	5	0	0.0	3	0	$190	1	0	1	4	$1,418	$0	$1,619	1.14	7.47
7818	ENL BARRACKS W/O DIN	RAD-1	25	23	0	0	0.0	3	0	$72	1	0	1	1	$570	$0	$614	1.08	7.92
7820	BN ADMIN & CLRM	AHU-1	10	18	5	57,604	294.2	0	0	$3,709	1	0	0	1	$348	$0	$33,445	96.11	0.09
7820	BN ADMIN & CLRM	AHU-1	10	29	0	3,548	75.6	0	0	$458	0	7	0	8	$3,378	$0	$4,255	1.26	7.37
7820	BN ADMIN & CLRM	AHU-1	10	33	0	153	9.6	0	0	$46	0	1	0	0	$272	$0	$433	1.59	5.92
7820	BN ADMIN & CLRM	AHU-1	10	35	0	1,211	0.0	0	0	$50	0	0	0	2	$399	$0	$439	1.10	7.98
7820	BN ADMIN & CLRM	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7820	BN ADMIN & CLRM	BLR-1	1	1	0	2,876	0.0	0	0	$119	2	0	0	0	$277	$0	$1,043	3.77	2.33
7820	BN ADMIN & CLRM	BLR-1	1	2	0	0	2.6	0	0	$11	0	0	0	3	$836	$0	$100	0.12	79.53
7820	BN ADMIN & CLRM	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7820	BN ADMIN & CLRM	CH-1	8	17	17	359	0.0	3	0	$526	1	0	1	0	$243	$0	$4,494	18.49	0.46
7824	BN ADMIN & CLRM	AHU-1	10	18	7	53,035	125.9	0	0	$2,899	1	0	0	1	$348	$0	$25,797	74.13	0.12
7824	BN ADMIN & CLRM	AHU-1	10	29	0	2,927	24.6	0	0	$222	0	7	0	8	$3,378	$0	$2,027	0.60	15.21
7824	BN ADMIN & CLRM	AHU-1	10	33	0	76	4.8	0	0	$23	0	1	0	0	$272	$0	$214	0.79	11.96
7824	BN ADMIN & CLRM	AHU-1	10	35	0	999	0.0	0	0	$41	0	0	0	2	$399	$0	$362	0.91	9.67
7824	BN ADMIN & CLRM	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93

BLDG NUM	BLDG NAME	EQUIP TAG	SYS TYPE	UCS FNCTN NUMBER	KW SVGS. PER YR	KWH SVGS. PER YR	MBtu SVGS. PER YR	LABOR HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL CONSTR COST	[illegible]	TOTAL DISC [illegible] SAVINGS	[illegible]	[illegible]
7824	BN ADMIN & CLRM	AHU-2	10	18	11	77,907	154.0	0	0	$4,132	1	0	0	1	$348	$0	$36,683	105.41	0.08
7824	BN ADMIN & CLRM	AHU-2	10	29	0	4,346	38.6	0	0	$339	0	7	0	8	$3,378	$0	$3,093	0.92	9.97
7824	BN ADMIN & CLRM	AHU-2	10	33	0	84	5.3	0	0	$25	0	1	0	0	$272	$0	$239	0.88	10.74
7824	BN ADMIN & CLRM	AHU-2	10	35	0	1,483	0.0	0	0	$61	0	0	0	2	$399	$0	$538	1.35	6.51
7824	BN ADMIN & CLRM	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7824	BN ADMIN & CLRM	AHU-3	10	18	7	53,035	125.9	0	0	$2,899	1	0	0	1	$348	$0	$25,797	74.13	0.12
7824	BN ADMIN & CLRM	AHU-3	10	29	0	2,927	24.6	0	0	$222	0	7	0	8	$3,378	$0	$2,027	0.60	15.21
7824	BN ADMIN & CLRM	AHU-3	10	33	0	76	4.8	0	0	$23	0	1	0	0	$272	$0	$214	0.79	11.96
7824	BN ADMIN & CLRM	AHU-3	10	35	0	999	0.0	0	0	$41	0	0	0	2	$399	$0	$362	0.91	9.67
7824	BN ADMIN & CLRM	AHU-3	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7824	BN ADMIN & CLRM	BLR-1	1	1	0	3,520	0.0	0	0	$145	2	0	0	0	$277	$0	$1,276	4.61	1.91
7824	BN ADMIN & CLRM	BLR-1	1	2	0	0	6.4	0	0	$26	0	0	0	3	$836	$0	$250	0.30	31.81
7824	BN ADMIN & CLRM	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7824	BN ADMIN & CLRM	CH-1	6	10	2	6,040	0.0	0	0	$294	1	0	1	0	$386	$0	$2,567	6.65	1.31
7824	BN ADMIN & CLRM	CH-1	6	11	0	1,248	0.0	0	0	$52	0	0	0	2	$664	$0	$452	0.68	12.89
7824	BN ADMIN & CLRM	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7824	BN ADMIN & CLRM	CH-1	6	42	60	0	0.0	0	0	$1,529	1	0	0	0	$150	$0	$13,040	86.94	0.10
7826	CLINIC W/O BEDS	AHU-1	10	18	0	18,257	257.3	0	0	$1,814	1	0	0	1	$348	$0	$16,724	48.06	0.19
7826	CLINIC W/O BEDS	AHU-1	10	29	0	902	55.2	0	0	$265	0	7	0	8	$3,378	$0	$2,496	0.74	12.75
7826	CLINIC W/O BEDS	AHU-1	10	33	0	238	9.9	0	0	$51	0	1	0	0	$272	$0	$475	1.75	5.38
7826	CLINIC W/O BEDS	AHU-1	10	35	0	2,365	0.0	0	0	$98	0	0	0	2	$399	$0	$857	2.15	4.09
7826	CLINIC W/O BEDS	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7826	CLINIC W/O BEDS	BLR-1	1	1	0	1,917	0.0	0	0	$79	2	0	0	0	$277	$0	$695	2.51	3.50
7826	CLINIC W/O BEDS	BLR-1	1	2	0	0	2.0	0	0	$8	0	0	0	3	$836	$0	$77	0.09	104.03
7826	CLINIC W/O BEDS	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7826	CLINIC W/O BEDS	CH-1	8	17	8	175	0.0	3	0	$294	1	0	1	0	$243	$0	$2,507	10.32	0.83
7832	GYMNASIUM	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7832	GYMNASIUM	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7832	GYMNASIUM	FC-1	16	18	0	296	155.3	0	0	$652	1	0	0	1	$348	$0	$6,205	17.83	0.53
7832	GYMNASIUM	FC-1	16	30	0	0	1.5	0	0	$6	0	1	0	3	$813	$0	$58	0.07	133.28
7832	GYMNASIUM	FC-2	16	18	0	296	155.3	0	0	$652	1	0	0	1	$348	$0	$6,205	17.83	0.53
7832	GYMNASIUM	FC-2	16	30	0	0	1.5	0	0	$6	0	1	0	3	$813	$0	$58	0.07	133.28
7832	GYMNASIUM	HV-1	16	18	0	3,195	873.1	0	0	$3,729	1	0	0	1	$348	$0	$35,440	101.84	0.09
7832	GYMNASIUM	HV-1	16	30	0	0	5.3	0	0	$22	0	1	0	3	$813	$0	$209	0.26	37.02
7832	GYMNASIUM	HV-2	16	18	0	3,195	873.1	0	0	$3,729	1	0	0	1	$348	$0	$35,440	101.84	0.09
7832	GYMNASIUM	HV-2	16	30	0	0	5.3	0	0	$22	0	1	0	3	$813	$0	$209	0.26	37.02
7832	GYMNASIUM	HV-3	16	18	0	3,195	873.1	0	0	$3,729	1	0	0	1	$348	$0	$35,440	101.84	0.09
7832	GYMNASIUM	HV-3	16	30	0	0	5.3	0	0	$22	0	1	0	3	$813	$0	$209	0.26	37.02
7832	GYMNASIUM	HV-4	16	18	0	3,195	873.1	0	0	$3,729	1	0	0	1	$348	$0	$35,440	101.84	0.09
7832	GYMNASIUM	HV-4	16	30	0	0	5.3	0	0	$22	0	1	0	3	$813	$0	$209	0.26	37.02
7832	GYMNASIUM	HV-5	16	18	0	3,195	873.1	0	0	$3,729	1	0	0	1	$348	$0	$35,440	101.84	0.09

											COST SVGS PER YR	DO PNT				TOTAL CONSTR COST			
7832	GYMNASIUM	HV-5	16	30	0	0	5.3	0	0	$22	0	1	0	3	$813	$0	$209	0.26	37.02
7834	REGIMENTAL HQ BLDG	BLR-1	1	2	0	0	4.0	0	0	$16	0	0	0	3	$836	$0	$156	0.19	51.12
7834	REGIMENTAL HQ BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7834	REGIMENTAL HQ BLDG	CH-1	6	10	1	4,078	0.0	0	0	$198	1	0	1	0	$386	$0	$1,733	4.49	1.95
7834	REGIMENTAL HQ BLDG	CH-1	6	11	0	525	0.0	0	0	$22	0	0	0	2	$664	$0	$190	0.29	30.62
7834	REGIMENTAL HQ BLDG	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7834	REGIMENTAL HQ BLDG	CH-1	6	42	25	0	0.0	0	0	$643	1	0	0	0	$150	$0	$5,487	36.58	0.23
7834	REGIMENTAL HQ BLDG	DTWP-1	24	22	1	4,380	0.0	3	0	$288	1	0	1	4	$1,418	$0	$2,503	1.77	4.92
7834	REGIMENTAL HQ BLDG	FC-1	19	20	0	19,941	28.1	0	0	$939	1	0	1	2	$1,213	$0	$8,334	6.87	1.29
7836	BN ADMIN & CLRM	AHU-1	10	18	7	53,035	125.9	0	0	$2,899	1	0	0	1	$348	$0	$25,797	74.13	0.12
7836	BN ADMIN & CLRM	AHU-1	10	29	0	2,927	24.6	0	0	$222	0	7	0	8	$3,378	$0	$2,027	0.60	15.21
7836	BN ADMIN & CLRM	AHU-1	10	33	0	76	4.8	0	0	$23	0	1	0	0	$272	$0	$214	0.79	11.96
7836	BN ADMIN & CLRM	AHU-1	10	35	0	999	0.0	0	0	$41	0	0	0	2	$399	$0	$362	0.91	9.67
7836	BN ADMIN & CLRM	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7836	BN ADMIN & CLRM	AHU-2	10	18	11	77,907	154.0	0	0	$4,132	1	0	0	1	$348	$0	$36,683	105.41	0.08
7836	BN ADMIN & CLRM	AHU-2	10	29	0	4,346	38.6	0	0	$339	0	7	0	8	$3,378	$0	$3,093	0.92	9.97
7836	BN ADMIN & CLRM	AHU-2	10	33	0	84	5.3	0	0	$25	0	1	0	0	$272	$0	$239	0.88	10.74
7836	BN ADMIN & CLRM	AHU-2	10	35	0	1,483	0.0	0	0	$61	0	0	0	2	$399	$0	$538	1.35	6.51
7836	BN ADMIN & CLRM	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7836	BN ADMIN & CLRM	AHU-3	10	18	7	53,035	125.9	0	0	$2,899	1	0	0	1	$348	$0	$25,797	74.13	0.12
7836	BN ADMIN & CLRM	AHU-3	10	29	0	2,927	24.6	0	0	$222	0	7	0	8	$3,378	$0	$2,027	0.60	15.21
7836	BN ADMIN & CLRM	AHU-3	10	33	0	76	4.8	0	0	$23	0	1	0	0	$272	$0	$214	0.79	11.96
7836	BN ADMIN & CLRM	AHU-3	10	35	0	999	0.0	0	0	$41	0	0	0	2	$399	$0	$362	0.91	9.67
7836	BN ADMIN & CLRM	AHU-3	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
7836	BN ADMIN & CLRM	BLR-1	1	1	0	3,520	0.0	0	0	$145	2	0	0	0	$277	$0	$1,276	4.61	1.91
7836	BN ADMIN & CLRM	BLR-1	1	2	0	0	6.4	0	0	$26	0	0	0	3	$836	$0	$250	0.30	31.81
7836	BN ADMIN & CLRM	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7836	BN ADMIN & CLRM	CH-1	6	10	2	6,040	0.0	0	0	$294	1	0	1	0	$386	$0	$2,567	6.65	1.31
7836	BN ADMIN & CLRM	CH-1	6	11	0	1,248	0.0	0	0	$52	0	0	0	2	$664	$0	$452	0.68	12.89
7836	BN ADMIN & CLRM	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7836	BN ADMIN & CLRM	CH-1	6	42	60	0	0.0	0	0	$1,529	1	0	0	0	$150	$0	$13,040	86.94	0.10
7842	ENL BARRACKS W/AS	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18
7842	ENL BARRACKS W/AS	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7842	ENL BARRACKS W/AS	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7842	ENL BARRACKS W/AS	CH-1	6	10	1	0	0.0	0	0	$30	1	0	1	0	$386	$0	$254	0.66	12.94
7842	ENL BARRACKS W/AS	CH-1	6	11	0	1,269	0.0	0	0	$52	0	0	0	2	$664	$0	$460	0.69	12.67
7842	ENL BARRACKS W/AS	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7842	ENL BARRACKS W/AS	CH-1	6	42	61	0	0.0	0	0	$1,555	1	0	0	0	$150	$0	$13,260	88.40	0.10
7842	ENL BARRACKS W/AS	DTWP-1	24	22	3	0	0.0	3	0	$142	1	0	1	4	$1,418	$0	$1,211	0.85	9.99
7842	ENL BARRACKS W/AS	DTWP-2	24	22	2	0	0.0	3	0	$117	1	0	1	4	$1,418	$0	$997	0.70	12.14
7842	ENL BARRACKS W/AS	DTWP-3	24	22	7	0	0.0	3	0	$262	1	0	1	4	$1,418	$0	$2,236	1.58	5.41

NO			TYPE		SVGS PER YR	KWH SVGS PER YR	SVGS PER YR	SVGS PER YR	MATL SAVGS PER YR	SVGS PER YR	DO PNT							
7842	ENL BARRACKS W/AS	DTWP-4	24	22	7	0	0.0	3	0	$262	1	0	1	4	$1,418	$0	$2,236	1.58	5.41
7844	ENL BARRACKS W/O DIN	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18
7844	ENL BARRACKS W/O DIN	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7844	ENL BARRACKS W/O DIN	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7844	ENL BARRACKS W/O DIN	CH-1	6	10	1	0	0.0	0	0	$30	1	0	1	0	$386	$0	$254	0.66	12.94
7844	ENL BARRACKS W/O DIN	CH-1	6	11	0	1,292	0.0	0	0	$53	0	0	0	2	$664	$0	$468	0.71	12.45
7844	ENL BARRACKS W/O DIN	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7844	ENL BARRACKS W/O DIN	CH-1	6	42	62	0	0.0	0	0	$1,582	1	0	0	0	$150	$0	$13,498	89.98	0.09
7844	ENL BARRACKS W/O DIN	DTWP-1	24	22	3	0	0.0	3	0	$142	1	0	1	4	$1,418	$0	$1,211	0.85	9.99
7844	ENL BARRACKS W/O DIN	DTWP-2	24	22	2	0	0.0	3	0	$117	1	0	1	4	$1,418	$0	$997	0.70	12.14
7844	ENL BARRACKS W/O DIN	DTWP-3	24	22	7	0	0.0	3	0	$262	1	0	1	4	$1,418	$0	$2,236	1.58	5.41
7844	ENL BARRACKS W/O DIN	DTWP-4	24	22	7	0	0.0	3	0	$262	1	0	1	4	$1,418	$0	$2,236	1.58	5.41
7846	ENL BARRACKS W/AS	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18
7846	ENL BARRACKS W/AS	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7846	ENL BARRACKS W/AS	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7846	ENL BARRACKS W/AS	CH-1	6	10	1	0	0.0	0	0	$30	1	0	1	0	$386	$0	$254	0.66	12.94
7846	ENL BARRACKS W/AS	CH-1	6	11	0	1,269	0.0	0	0	$52	0	0	0	2	$664	$0	$460	0.69	12.67
7846	ENL BARRACKS W/AS	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7846	ENL BARRACKS W/AS	CH-1	6	42	61	0	0.0	0	0	$1,555	1	0	0	0	$150	$0	$13,260	88.40	0.10
7846	ENL BARRACKS W/AS	DTWP-1	24	22	3	0	0.0	3	0	$142	1	0	1	4	$1,418	$0	$1,211	0.85	9.99
7846	ENL BARRACKS W/AS	DTWP-2	24	22	2	0	0.0	3	0	$117	1	0	1	4	$1,418	$0	$997	0.70	12.14
7846	ENL BARRACKS W/AS	DTWP-3	24	22	7	0	0.0	3	0	$262	1	0	1	4	$1,418	$0	$2,236	1.58	5.41
7846	ENL BARRACKS W/AS	DTWP-4	24	22	7	0	0.0	3	0	$262	1	0	1	4	$1,418	$0	$2,236	1.58	5.41
7848	ENL BARRACKS W/O DIN	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18
7848	ENL BARRACKS W/O DIN	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7848	ENL BARRACKS W/O DIN	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7848	ENL BARRACKS W/O DIN	CH-1	6	10	1	0	0.0	0	0	$30	1	0	1	0	$386	$0	$254	0.66	12.94
7848	ENL BARRACKS W/O DIN	CH-1	6	11	0	1,292	0.0	0	0	$53	0	0	0	2	$664	$0	$468	0.71	12.45
7848	ENL BARRACKS W/O DIN	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7848	ENL BARRACKS W/O DIN	CH-1	6	42	62	0	0.0	0	0	$1,582	1	0	0	0	$150	$0	$13,498	89.98	0.09
7848	ENL BARRACKS W/O DIN	DTWP-1	24	22	3	0	0.0	3	0	$142	1	0	1	4	$1,418	$0	$1,211	0.85	9.99
7848	ENL BARRACKS W/O DIN	DTWP-2	24	22	2	0	0.0	3	0	$117	1	0	1	4	$1,418	$0	$997	0.70	12.14
7848	ENL BARRACKS W/O DIN	DTWP-3	24	22	7	0	0.0	3	0	$262	1	0	1	4	$1,418	$0	$2,236	1.58	5.41
7848	ENL BARRACKS W/O DIN	DTWP-4	24	22	7	0	0.0	3	0	$262	1	0	1	4	$1,418	$0	$2,236	1.58	5.41
7850	ENL BARRACKS W/AS	BLR-1	1	2	0	0	16.7	0	0	$69	0	0	0	3	$836	$0	$654	0.78	12.18
7850	ENL BARRACKS W/AS	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7850	ENL BARRACKS W/AS	BLR-2	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7850	ENL BARRACKS W/AS	CH-1	6	10	1	0	0.0	0	0	$30	1	0	1	0	$386	$0	$254	0.66	12.94
7850	ENL BARRACKS W/AS	CH-1	6	11	0	1,269	0.0	0	0	$52	0	0	0	2	$664	$0	$460	0.69	12.67
7850	ENL BARRACKS W/AS	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7850	ENL BARRACKS W/AS	CH-1	6	42	61	0	0.0	0	0	$1,555	1	0	0	0	$150	$0	$13,260	88.40	0.10

BLDG NO	BLDG NAME	[illegible]	TYPE	NUMBER	SVGS. PER YR	SVGS. PER YR	MBTU SVGS. PER YR	LABOR HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	DO PNT	AO PNT	DI PNT	AI PNT	COSTS	PER YR	[illegible]	[illegible]	[illegible]
7850	ENL BARRACKS W/AS	DTWP-1	24	22	3	0	0.0	3	0	$142	1	0	1	4	$1,418	$0	$1,211	0.85	9.99
7850	ENL BARRACKS W/AS	DTWP-2	24	22	2	0	0.0	3	0	$117	1	0	1	4	$1,418	$0	$997	0.70	12.14
7850	ENL BARRACKS W/AS	DTWP-2	24	22	7	0	0.0	3	0	$262	1	0	1	4	$1,418	$0	$2,236	1.58	5.41
7850	ENL BARRACKS W/AS	DTWP-4	24	22	7	0	0.0	3	0	$262	1	0	1	4	$1,418	$0	$2,236	1.58	5.41
7852	ADMIN & SUPPORT BLDG	BLR-1	1	2	0	0	3.3	0	0	$14	0	0	0	3	$836	$0	$130	0.16	61.07
7852	ADMIN & SUPPORT BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7852	ADMIN & SUPPORT BLDG	CH-1	6	11	0	252	0.0	0	0	$10	0	0	0	2	$664	$0	$91	0.14	63.80
7852	ADMIN & SUPPORT BLDG	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7852	ADMIN & SUPPORT BLDG	CH-1	6	42	12	0	0.0	0	0	$309	1	0	0	0	$150	$0	$2,634	17.56	0.49
7852	ADMIN & SUPPORT BLDG	CH-2	6	11	0	88	0.0	0	0	$4	0	0	0	2	$664	$0	$32	0.05	183.74
7852	ADMIN & SUPPORT BLDG	CH-2	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7852	ADMIN & SUPPORT BLDG	CH-2	6	42	4	0	0.0	0	0	$107	1	0	0	0	$150	$0	$914	6.10	1.40
7852	ADMIN & SUPPORT BLDG	DTWP-1	24	22	2	8,128	0.0	3	0	$471	1	0	1	4	$1,418	$0	$4,098	2.89	3.01
7852	ADMIN & SUPPORT BLDG	FC-1	19	20	0	15,216	160.8	0	0	$1,291	1	0	1	2	$1,213	$0	$11,832	9.75	0.94
7852	ADMIN & SUPPORT BLDG	RAD-1	25	23	0	1,917	0.0	3	0	$151	1	0	1	1	$570	$0	$1,309	2.30	3.77
7854	BN HQ BLDG	AHU-1	15	18	5	40,886	37.6	0	0	$1,961	1	0	0	1	$348	$0	$17,309	49.74	0.18
7854	BN HQ BLDG	AHU-1	15	27	0	5,832	31.0	0	0	$368	0	2	0	3	$1,097	$0	$3,330	3.04	2.98
7854	BN HQ BLDG	AHU-2	15	18	5	41,798	37.6	0	0	$1,999	1	0	0	1	$348	$0	$17,639	50.69	0.17
7854	BN HQ BLDG	AHU-2	15	27	0	6,014	31.0	0	0	$376	0	2	0	3	$1,097	$0	$3,396	3.10	2.92
7854	BN HQ BLDG	BLR-1	1	2	0	0	5.8	0	0	$24	0	0	0	3	$836	$0	$228	0.27	34.98
7854	BN HQ BLDG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7854	BN HQ BLDG	CH-1	6	10	3	7,917	0.0	0	0	$398	1	0	1	0	$386	$0	$3,479	9.01	0.97
7854	BN HQ BLDG	CH-1	6	11	0	1,292	0.0	0	0	$53	0	0	0	2	$664	$0	$468	0.71	12.45
7854	BN HQ BLDG	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7854	BN HQ BLDG	CH-1	6	42	62	0	0.0	0	0	$1,582	1	0	0	0	$150	$0	$13,498	89.98	0.09
7854	BN HQ BLDG	RAD-1	25	23	0	2,225	0.0	3	0	$164	1	0	1	1	$570	$0	$1,421	2.49	3.48
7856	ENL PERS DIN	AHU-1	15	18	7	14,219	164.2	0	0	$1,454	1	0	0	1	$348	$0	$13,224	38.00	0.24
7856	ENL PERS DIN	AHU-1	15	27	0	8,607	19.3	0	0	$435	0	2	0	3	$1,097	$0	$3,880	3.54	2.52
7856	ENL PERS DIN	AHU-1	15	33	0	399	18.2	0	0	$91	0	1	0	0	$272	$0	$859	3.16	2.98
7856	ENL PERS DIN	AHU-1	15	36	0	3,768	0.0	0	0	$156	0	0	0	2	$399	$0	$1,366	3.42	2.56
7856	ENL PERS DIN	AHU-2	15	18	7	14,435	168.3	0	0	$1,480	1	0	0	1	$348	$0	$13,464	38.69	0.24
7856	ENL PERS DIN	AHU-2	15	27	0	8,914	19.3	0	0	$448	0	2	0	3	$1,097	$0	$3,991	3.64	2.45
7856	ENL PERS DIN	AHU-2	15	33	0	413	18.8	0	0	$95	0	1	0	0	$272	$0	$890	3.27	2.87
7856	ENL PERS DIN	AHU-2	15	36	0	3,902	0.0	0	0	$161	0	0	0	2	$399	$0	$1,415	3.55	2.48
7856	ENL PERS DIN	BLR-1	3	7	0	0	0.0	4	0	$96	1	0	3	1	$1,015	$0	$819	0.81	10.57
7856	ENL PERS DIN	CH-1	6	10	3	3,821	0.0	0	0	$229	1	0	1	0	$386	$0	$1,994	5.17	1.68
7856	ENL PERS DIN	CH-1	6	11	0	1,243	0.0	0	0	$51	0	0	0	2	$664	$0	$451	0.68	12.94
7856	ENL PERS DIN	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7856	ENL PERS DIN	CH-1	6	42	60	0	0.0	0	0	$1,522	1	0	0	0	$150	$0	$12,986	86.57	0.10
7856	ENL PERS DIN	CV-1	5	8	0	1,801	0.0	0	0	$74	1	0	1	0	$386	$0	$653	1.69	5.19
7856	ENL PERS DIN	CV-1	5	9	0	0	12.5	0	0	$51	0	1	0	3	$1,109	$0	$490	0.44	21.58

[illegible]	[illegible]	[illegible]	TYPE	[illegible]	[illegible] PER YR	KWH SVGS PER YR	[illegible] SVGS PER YR	LABOR HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL CONSTR COST	[illegible] COST PER YR	[illegible] SAVINGS	[illegible]	[illegible]
7856	ENL PERS DIN	HV-1	16	18	0	8,170	486.9	0	0	$2,343	1	0	0	1	$348	$0	$22,079	63.45	0.15
7856	ENL PERS DIN	HV-1	16	30	0	0	4.7	0	0	$19	0	1	0	3	$813	$0	$186	0.23	41.71
7856	ENL PERS DIN	HV-2	16	18	0	2,703	243.4	0	0	$1,115	1	0	0	1	$348	$0	$10,538	30.28	0.31
7856	ENL PERS DIN	HV-2	16	30	0	0	2.4	0	0	$10	0	1	0	3	$813	$0	$93	0.11	83.41
7858	ADMIN & SUPPORT BLDG	CH-1	6	11	0	252	0.0	0	0	$10	0	0	0	2	$664	$0	$91	0.14	63.80
7858	ADMIN & SUPPORT BLDG	CH-1	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
7858	ADMIN & SUPPORT BLDG	CH-1	6	42	12	0	0.0	0	0	$309	1	0	0	0	$150	$0	$2,634	17.56	0.49
7858	ADMIN & SUPPORT BLDG	FC-1	19	20	0	15,216	160.8	0	0	$1,291	1	0	1	2	$1,213	$0	$11,832	9.75	0.94
7858	ADMIN & SUPPORT BLDG	RAD-1	25	23	0	2,876	0.0	3	0	$191	1	0	1	1	$570	$0	$1,657	2.91	2.99
7865	UNIT CHAPEL	AHU-1	15	18	7	38,042	353.7	0	0	$3,218	1	0	0	1	$348	$0	$29,304	84.21	0.11
7865	UNIT CHAPEL	AHU-1	15	27	0	17,722	77.4	0	0	$1,051	0	2	0	3	$1,097	$0	$9,465	8.63	1.04
7865	UNIT CHAPEL	AHU-1	15	33	0	232	11.3	0	0	$56	0	1	0	0	$272	$0	$527	1.94	4.85
7865	UNIT CHAPEL	AHU-1	15	36	0	3,659	0.0	0	0	$151	0	0	0	2	$399	$0	$1,327	3.33	2.64
7865	UNIT CHAPEL	BLR-1	1	1	0	1,729	0.0	0	0	$71	2	0	0	0	$277	$0	$627	2.26	3.88
7865	UNIT CHAPEL	BLR-1	1	2	0	0	6.4	0	0	$26	0	0	0	3	$836	$0	$250	0.30	31.81
7865	UNIT CHAPEL	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7865	UNIT CHAPEL	CH-1	8	17	10	210	0.0	3	0	$338	1	0	1	0	$243	$0	$2,885	11.87	0.72
7865	UNIT CHAPEL	CH-2	8	17	25	525	0.0	3	0	$737	1	0	1	0	$243	$0	$6,291	25.89	0.33
7865	UNIT CHAPEL	DTWP-1	24	22	3	9,244	0.0	3	0	$533	1	0	1	4	$1,418	$0	$4,645	3.28	2.66
7865	UNIT CHAPEL	FC-1	19	20	0	8,528	12.4	0	0	$403	1	0	1	2	$1,213	$0	$3,579	2.95	3.01
7866	THEATER W/DRESS RM	ACCU-1	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
7866	THEATER W/DRESS RM	AHU-1	15	18	14	118,998	1,158.6	0	0	$10,050	1	0	0	1	$348	$0	$91,726	263.58	0.03
7866	THEATER W/DRESS RM	AHU-1	15	27	0	12,684	332.7	0	0	$1,895	0	2	0	3	$1,097	$0	$17,663	16.10	0.58
7866	THEATER W/DRESS RM	AHU-1	15	33	0	521	23.5	0	0	$118	0	1	0	0	$272	$0	$1,113	4.09	2.30
7866	THEATER W/DRESS RM	AHU-1	15	36	0	3,411	0.0	0	0	$141	0	0	0	2	$399	$0	$1,237	3.10	2.83
7866	THEATER W/DRESS RM	AHU-2	15	18	2	17,080	118.3	0	0	$1,256	1	0	0	1	$348	$0	$11,375	32.69	0.28
7866	THEATER W/DRESS RM	AHU-2	15	27	0	1,575	37.0	0	0	$217	0	2	0	3	$1,097	$0	$2,022	1.84	5.05
7866	THEATER W/DRESS RM	AHU-2	15	33	0	49	2.2	0	0	$11	0	1	0	0	$272	$0	$104	0.38	24.66
7866	THEATER W/DRESS RM	AHU-2	15	36	0	423	0.0	0	0	$17	0	0	0	2	$399	$0	$154	0.38	22.81
7866	THEATER W/DRESS RM	BLR-1	1	1	0	2,273	0.0	0	0	$94	2	0	0	0	$277	$0	$824	2.98	2.95
7866	THEATER W/DRESS RM	BLR-1	1	2	0	0	5.6	0	0	$23	0	0	0	3	$836	$0	$219	0.26	36.42
7866	THEATER W/DRESS RM	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
7866	THEATER W/DRESS RM	CH-1	8	17	25	525	0.0	3	0	$737	1	0	1	0	$243	$0	$6,291	25.89	0.33
7866	THEATER W/DRESS RM	HWP-1	26	24	0	4,237	0.0	3	0	$247	1	0	1	0	$386	$0	$2,151	5.57	1.56
7866	THEATER W/DRESS RM	HWP-2	26	24	0	4,237	0.0	3	0	$247	1	0	1	0	$386	$0	$2,151	5.57	1.56
7900	VEH MNT SHOP ORG	AHU-1	15	18	0	3,685	60.1	0	0	$400	1	0	0	1	$348	$0	$3,696	10.62	0.87
7900	VEH MNT SHOP ORG	AHU-1	15	27	0	0	25.9	0	0	$107	0	2	0	3	$1,097	$0	$1,016	0.93	10.29
7900	VEH MNT SHOP ORG	AHU-2	15	18	0	1,932	42.9	0	0	$257	1	0	0	1	$348	$0	$2,386	6.86	1.36
7900	VEH MNT SHOP ORG	AHU-2	15	27	0	0	18.5	0	0	$76	0	2	0	3	$1,097	$0	$726	0.66	14.40
7900	VEH MNT SHOP ORG	AHU-3	15	18	0	1,932	42.9	0	0	$257	1	0	0	1	$348	$0	$2,386	6.86	1.36
7900	VEH MNT SHOP ORG	AHU-3	15	27	0	0	18.5	0	0	$76	0	2	0	3	$1,097	$0	$726	0.66	14.40

BLDG NO	[illegible]	[illegible]	SYS TYPE	[illegible] NUMBER	[illegible] SVGS. PER YR	KWH SVGS. PER YR	[illegible] SVGS. PER YR	LABOR HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	DO PNT	[illegible] PNT	[illegible] PNT	AI PNT	[illegible] CONSTR. COST	[illegible]	[illegible]	[illegible]	[illegible]
7900	VEH MNT SHOP ORG	AHU-4	15	18	0	1,932	42.9	0	0	$257	1	0	0	1	$348	$0	$2,386	6.86	1.36
7900	VEH MNT SHOP ORG	AHU-4	15	27	0	0	18.5	0	0	$76	0	2	0	3	$1,097	$0	$726	0.66	14.40
7900	VEH MNT SHOP ORG	AHU-5	15	18	0	1,932	51.5	0	0	$292	1	0	0	1	$348	$0	$2,723	7.83	1.19
7900	VEH MNT SHOP ORG	AHU-5	15	27	0	0	22.2	0	0	$91	0	2	0	3	$1,097	$0	$871	0.79	12.00
7900	VEH MNT SHOP ORG	AHU-6	15	18	0	5,169	111.6	0	0	$673	1	0	0	1	$348	$0	$6,257	17.98	0.52
7900	VEH MNT SHOP ORG	AHU-6	15	27	0	0	48.1	0	0	$198	0	2	0	3	$1,097	$0	$1,887	1.72	5.54
7900	VEH MNT SHOP ORG	MAU-1	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29
7900	VEH MNT SHOP ORG	MAU-1	16	30	0	0	29.5	0	0	$122	0	1	0	3	$813	$0	$1,158	1.42	6.69
7900	VEH MNT SHOP ORG	MAU-2	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29
7900	VEH MNT SHOP ORG	MAU-2	16	30	0	0	29.5	0	0	$122	0	1	0	3	$813	$0	$1,158	1.42	6.69
7900	VEH MNT SHOP ORG	MAU-3	16	18	0	23,016	0.0	0	0	$951	1	0	0	1	$348	$0	$8,346	23.98	0.37
7900	VEH MNT SHOP ORG	MAU-3	16	30	0	0	59.0	0	0	$243	0	1	0	3	$813	$0	$2,317	2.85	3.34
7900	VEH MNT SHOP ORG	RAD-1	20	20	0	1,932	206.1	0	0	$929	1	0	1	2	$1,213	$0	$8,792	7.25	1.31
7900	VEH MNT SHOP ORG	RAD-2	20	20	0	1,295	137.4	0	0	$620	1	0	1	2	$1,213	$0	$5,864	4.83	1.96
7920	VEH MNT SHOP DS	ACCU-1	8	17	3	70	0.0	3	0	$161	1	0	1	0	$243	$0	$1,371	5.64	1.51
7920	VEH MNT SHOP DS	ACCU-2	8	17	3	70	0.0	3	0	$161	1	0	1	0	$243	$0	$1,371	5.64	1.51
7920	VEH MNT SHOP DS	ACCU-3	8	17	3	53	0.0	3	0	$138	1	0	1	0	$243	$0	$1,182	4.86	1.75
7920	VEH MNT SHOP DS	ACCU-4	8	17	3	70	0.0	3	0	$161	1	0	1	0	$243	$0	$1,371	5.64	1.51
7920	VEH MNT SHOP DS	ACCU-5	8	17	3	70	0.0	3	0	$161	1	0	1	0	$243	$0	$1,371	5.64	1.51
7920	VEH MNT SHOP DS	ACCU-6	8	17	3	70	0.0	3	0	$161	1	0	1	0	$243	$0	$1,371	5.64	1.51
7920	VEH MNT SHOP DS	ACCU-7	8	17	7	140	0.0	3	0	$249	1	0	1	0	$243	$0	$2,128	8.76	0.97
7920	VEH MNT SHOP DS	AHU-1	15	18	3	18,142	52.4	0	0	$1,045	1	0	0	1	$348	$0	$9,316	26.77	0.33
7920	VEH MNT SHOP DS	AHU-1	15	27	0	612	32.6	0	0	$160	0	2	0	3	$1,097	$0	$1,503	1.37	6.87
7920	VEH MNT SHOP DS	AHU-1	15	33	0	9	0.6	0	0	$3	0	1	0	0	$272	$0	$27	0.10	96.07
7920	VEH MNT SHOP DS	AHU-1	15	36	0	209	0.0	0	0	$9	0	0	0	2	$399	$0	$76	0.19	46.24
7920	VEH MNT SHOP DS	AHU-2	15	18	3	20,524	56.4	0	0	$1,160	1	0	0	1	$348	$0	$10,336	29.70	0.30
7920	VEH MNT SHOP DS	AHU-2	15	27	0	804	32.6	0	0	$168	0	2	0	3	$1,097	$0	$1,572	1.43	6.55
7920	VEH MNT SHOP DS	AHU-2	15	33	0	12	0.8	0	0	$4	0	1	0	0	$272	$0	$35	0.13	73.20
7920	VEH MNT SHOP DS	AHU-2	15	36	0	274	0.0	0	0	$11	0	0	0	2	$399	$0	$99	0.25	35.23
7920	VEH MNT SHOP DS	AHU-3	15	18	3	18,142	52.4	0	0	$1,045	1	0	0	1	$348	$0	$9,316	26.77	0.33
7920	VEH MNT SHOP DS	AHU-3	15	27	0	612	32.6	0	0	$160	0	2	0	3	$1,097	$0	$1,503	1.37	6.87
7920	VEH MNT SHOP DS	AHU-3	15	33	0	9	0.6	0	0	$3	0	1	0	0	$272	$0	$27	0.10	96.07
7920	VEH MNT SHOP DS	AHU-3	15	36	0	209	0.0	0	0	$9	0	0	0	2	$399	$0	$76	0.19	46.24
7920	VEH MNT SHOP DS	AHU-4	15	18	3	18,142	52.4	0	0	$1,045	1	0	0	1	$348	$0	$9,316	26.77	0.33
7920	VEH MNT SHOP DS	AHU-4	15	27	0	612	32.6	0	0	$160	0	2	0	3	$1,097	$0	$1,503	1.37	6.87
7920	VEH MNT SHOP DS	AHU-4	15	33	0	9	0.6	0	0	$3	0	1	0	0	$272	$0	$27	0.10	96.07
7920	VEH MNT SHOP DS	AHU-4	15	36	0	209	0.0	0	0	$9	0	0	0	2	$399	$0	$76	0.19	46.24
7920	VEH MNT SHOP DS	AHU-5	15	18	3	18,142	52.4	0	0	$1,045	1	0	0	1	$348	$0	$9,316	26.77	0.33
7920	VEH MNT SHOP DS	AHU-5	15	27	0	612	32.6	0	0	$160	0	2	0	3	$1,097	$0	$1,503	1.37	6.87
7920	VEH MNT SHOP DS	AHU-5	15	33	0	9	0.6	0	0	$3	0	1	0	0	$272	$0	$27	0.10	96.07
7920	VEH MNT SHOP DS	AHU-5	15	36	0	209	0.0	0	0	$9	0	0	0	2	$399	$0	$76	0.19	46.24

BLDG NO	BLDG NAME	EQUIP TAG	SYS TYPE	ECO NUMBER	KW SVGS. PER YR	KWH SVGS. PER YR	MBtu SVGS. PER YR	LABOR HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	DO PNT	AI PNT	DI PNT	AI PNT	TOTAL CONSTR COST	[illegible] PER YR	[illegible] DISC SAVINGS	[illegible]	PAYBACK
7920	VEH MNT SHOP DS	AHU-6	15	18	3	18,142	52.4	0	0	$1,045	1	0	0	1	$348	$0	$9,316	26.77	0.33
7920	VEH MNT SHOP DS	AHU-6	15	27	0	612	32.6	0	0	$160	0	2	0	3	$1,097	$0	$1,503	1.37	6.87
7920	VEH MNT SHOP DS	AHU-6	15	33	0	9	0.6	0	0	$3	0	1	0	0	$272	$0	$27	0.10	96.07
7920	VEH MNT SHOP DS	AHU-6	15	36	0	209	0.0	0	0	$9	0	0	0	2	$399	$0	$76	0.19	46.24
7920	VEH MNT SHOP DS	AHU-7	15	18	3	34,020	79.0	0	0	$1,810	1	0	0	1	$348	$0	$16,118	46.32	0.19
7920	VEH MNT SHOP DS	AHU-7	15	27	0	1,888	32.6	0	0	$212	0	2	0	3	$1,097	$0	$1,965	1.79	5.17
7920	VEH MNT SHOP DS	AHU-7	15	33	0	29	1.8	0	0	$9	0	1	0	0	$272	$0	$82	0.30	31.16
7920	VEH MNT SHOP DS	AHU-7	15	36	0	644	0.0	0	0	$27	0	0	0	2	$399	$0	$234	0.59	15.00
7920	VEH MNT SHOP DS	HV-1	16	18	0	9,829	102.2	0	0	$827	1	0	0	1	$348	$0	$7,577	21.77	0.42
7920	VEH MNT SHOP DS	HV-1	16	30	0	0	44.0	0	0	$181	0	1	0	3	$813	$0	$1,728	2.12	4.48
7920	VEH MNT SHOP DS	HV-2	16	18	0	9,829	102.2	0	0	$827	1	0	0	1	$348	$0	$7,577	21.77	0.42
7920	VEH MNT SHOP DS	HV-2	16	30	0	0	44.0	0	0	$181	0	1	0	3	$813	$0	$1,728	2.12	4.48
7920	VEH MNT SHOP DS	HV-3	16	18	0	9,829	102.2	0	0	$827	1	0	0	1	$348	$0	$7,577	21.77	0.42
7920	VEH MNT SHOP DS	HV-3	16	30	0	0	44.0	0	0	$181	0	1	0	3	$813	$0	$1,728	2.12	4.48
7920	VEH MNT SHOP DS	HV-4	16	18	0	6,637	102.2	0	0	$695	1	0	0	1	$348	$0	$6,419	18.45	0.50
7920	VEH MNT SHOP DS	HV-4	16	30	0	0	44.0	0	0	$181	0	1	0	3	$813	$0	$1,728	2.12	4.48
7920	VEH MNT SHOP DS	HV-5	16	18	0	6,637	102.2	0	0	$695	1	0	0	1	$348	$0	$6,419	18.45	0.50
7920	VEH MNT SHOP DS	HV-5	16	30	0	0	44.0	0	0	$181	0	1	0	3	$813	$0	$1,728	2.12	4.48
7920	VEH MNT SHOP DS	MAU-1	16	18	0	23,360	0.0	0	0	$965	1	0	0	1	$348	$0	$8,471	24.34	0.36
7920	VEH MNT SHOP DS	MAU-1	16	30	0	0	70.2	0	0	$289	0	1	0	3	$813	$0	$2,757	3.39	2.81
7920	VEH MNT SHOP DS	MAU-2	16	18	0	30,167	0.0	0	0	$1,246	1	0	0	1	$348	$0	$10,939	31.43	0.28
7920	VEH MNT SHOP DS	MAU-2	16	30	0	0	70.2	0	0	$289	0	1	0	3	$813	$0	$2,757	3.39	2.81
7920	VEH MNT SHOP DS	MAU-3	16	18	0	23,360	0.0	0	0	$965	1	0	0	1	$348	$0	$8,471	24.34	0.36
7920	VEH MNT SHOP DS	MAU-3	16	30	0	0	70.2	0	0	$289	0	1	0	3	$813	$0	$2,757	3.39	2.81
7920	VEH MNT SHOP DS	MAU-4	16	18	0	15,860	0.0	0	0	$655	1	0	0	1	$348	$0	$5,751	16.53	0.53
7920	VEH MNT SHOP DS	MAU-4	16	30	0	0	70.2	0	0	$289	0	1	0	3	$813	$0	$2,757	3.39	2.81
7920	VEH MNT SHOP DS	MAU-5	16	18	0	23,360	0.0	0	0	$965	1	0	0	1	$348	$0	$8,471	24.34	0.36
7920	VEH MNT SHOP DS	MAU-5	16	30	0	0	70.2	0	0	$289	0	1	0	3	$813	$0	$2,757	3.39	2.81
7920	VEH MNT SHOP DS	MAU-6	16	18	0	15,860	0.0	0	0	$655	1	0	0	1	$348	$0	$5,751	16.53	0.53
7920	VEH MNT SHOP DS	MAU-6	16	30	0	0	70.2	0	0	$289	0	1	0	3	$813	$0	$2,757	3.39	2.81
7920	VEH MNT SHOP DS	RAD-1	20	20	0	0	310.7	0	0	$1,280	1	0	1	2	$1,213	$0	$12,198	10.06	0.95
7920	VEH MNT SHOP DS	RAD-2	20	20	0	0	310.7	0	0	$1,280	1	0	1	2	$1,213	$0	$12,198	10.06	0.95
7920	VEH MNT SHOP DS	RAD-3	20	20	0	0	310.7	0	0	$1,280	1	0	1	2	$1,213	$0	$12,198	10.06	0.95
7920	VEH MNT SHOP DS	RAD-4	20	20	0	0	310.7	0	0	$1,280	1	0	1	2	$1,213	$0	$12,198	10.06	0.95
7920	VEH MNT SHOP DS	RAD-5	20	20	0	0	310.7	0	0	$1,280	1	0	1	2	$1,213	$0	$12,198	10.06	0.95
7920	VEH MNT SHOP DS	UH-1	21	20	0	15,860	735.8	0	0	$3,687	1	0	1	2	$1,213	$0	$34,641	28.56	0.33
7940	VEH MNT SHOP ORG	AHU-1	15	18	0	3,685	63.4	0	0	$414	1	0	0	1	$348	$0	$3,827	11.00	0.84
7940	VEH MNT SHOP ORG	AHU-1	15	27	0	0	27.3	0	0	$113	0	2	0	3	$1,097	$0	$1,072	0.98	9.75
7940	VEH MNT SHOP ORG	AHU-2	15	18	0	1,932	45.3	0	0	$266	1	0	0	1	$348	$0	$2,479	7.12	1.31
7940	VEH MNT SHOP ORG	AHU-2	15	27	0	0	19.5	0	0	$80	0	2	0	3	$1,097	$0	$766	0.70	13.65
7940	VEH MNT SHOP ORG	AHU-3	15	18	0	1,932	45.3	0	0	$266	1	0	0	1	$348	$0	$2,479	7.12	1.31

7940	VEH MNT SHOP ORG	AHU-3	15	27	0	0	19.5	0	0	$80	0	2	0	3	$1,097	$0	$766	0.70	13.65
7940	VEH MNT SHOP ORG	AHU-4	15	18	0	1,932	45.3	0	0	$266	1	0	0	1	$348	$0	$2,479	7.12	1.31
7940	VEH MNT SHOP ORG	AHU-4	15	27	0	0	19.5	0	0	$80	0	2	0	3	$1,097	$0	$766	0.70	13.65
7940	VEH MNT SHOP ORG	AHU-5	15	18	0	1,932	54.4	0	0	$304	1	0	0	1	$348	$0	$2,835	8.15	1.15
7940	VEH MNT SHOP ORG	AHU-5	15	27	0	0	23.4	0	0	$96	0	2	0	3	$1,097	$0	$919	0.84	11.38
7940	VEH MNT SHOP ORG	AHU-6	15	18	0	5,169	117.8	0	0	$699	1	0	0	1	$348	$0	$6,500	18.68	0.50
7940	VEH MNT SHOP ORG	AHU-6	15	27	0	0	50.7	0	0	$209	0	2	0	3	$1,097	$0	$1,991	1.82	5.25
7940	VEH MNT SHOP ORG	MAU-1	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29
7940	VEH MNT SHOP ORG	MAU-1	16	30	0	0	31.1	0	0	$128	0	1	0	3	$813	$0	$1,222	1.50	6.34
7940	VEH MNT SHOP ORG	MAU-2	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29
7940	VEH MNT SHOP ORG	MAU-2	16	30	0	0	31.1	0	0	$128	0	1	0	3	$813	$0	$1,222	1.50	6.34
7940	VEH MNT SHOP ORG	MAU-3	16	18	0	15,626	0.0	0	0	$645	1	0	0	1	$348	$0	$5,666	16.28	0.54
7940	VEH MNT SHOP ORG	MAU-3	16	30	0	0	62.3	0	0	$257	0	1	0	3	$813	$0	$2,445	3.01	3.17
7940	VEH MNT SHOP ORG	RAD-1	20	20	0	1,932	217.5	0	0	$976	1	0	1	2	$1,213	$0	$9,239	7.62	1.24
7940	VEH MNT SHOP ORG	RAD-2	20	20	0	1,295	145.0	0	0	$651	1	0	1	2	$1,213	$0	$6,162	5.08	1.86
7960	VEH MNT SHOP ORG	AHU-1	15	18	0	3,685	57.3	0	0	$388	1	0	0	1	$348	$0	$3,587	10.31	0.90
7960	VEH MNT SHOP ORG	AHU-1	15	27	0	0	24.7	0	0	$102	0	2	0	3	$1,097	$0	$969	0.88	10.79
7960	VEH MNT SHOP ORG	AHU-2	15	18	0	1,932	40.9	0	0	$248	1	0	0	1	$348	$0	$2,308	6.63	1.40
7960	VEH MNT SHOP ORG	AHU-2	15	27	0	0	17.6	0	0	$73	0	2	0	3	$1,097	$0	$692	0.63	15.11
7960	VEH MNT SHOP ORG	AHU-3	15	18	0	1,932	40.9	0	0	$248	1	0	0	1	$348	$0	$2,308	6.63	1.40
7960	VEH MNT SHOP ORG	AHU-3	15	27	0	0	17.6	0	0	$73	0	2	0	3	$1,097	$0	$692	0.63	15.11
7960	VEH MNT SHOP ORG	AHU-4	15	18	0	1,932	40.9	0	0	$248	1	0	0	1	$348	$0	$2,308	6.63	1.40
7960	VEH MNT SHOP ORG	AHU-4	15	27	0	0	17.6	0	0	$73	0	2	0	3	$1,097	$0	$692	0.63	15.11
7960	VEH MNT SHOP ORG	AHU-5	15	18	0	1,932	49.1	0	0	$282	1	0	0	1	$348	$0	$2,629	7.56	1.23
7960	VEH MNT SHOP ORG	AHU-5	15	27	0	0	21.2	0	0	$87	0	2	0	3	$1,097	$0	$830	0.76	12.59
7960	VEH MNT SHOP ORG	AHU-6	15	18	0	5,169	106.4	0	0	$652	1	0	0	1	$348	$0	$6,054	17.40	0.53
7960	VEH MNT SHOP ORG	AHU-6	15	27	0	0	45.8	0	0	$189	0	2	0	3	$1,097	$0	$1,799	1.64	5.81
7960	VEH MNT SHOP ORG	MAU-1	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29
7960	VEH MNT SHOP ORG	MAU-1	16	30	0	0	28.1	0	0	$116	0	1	0	3	$813	$0	$1,105	1.36	7.01
7960	VEH MNT SHOP ORG	MAU-2	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29
7960	VEH MNT SHOP ORG	MAU-2	16	30	0	0	28.1	0	0	$116	0	1	0	3	$813	$0	$1,105	1.36	7.01
7960	VEH MNT SHOP ORG	MAU-3	16	18	0	23,016	0.0	0	0	$951	1	0	0	1	$348	$0	$8,346	23.98	0.37
7960	VEH MNT SHOP ORG	MAU-3	16	30	0	0	56.3	0	0	$232	0	1	0	3	$813	$0	$2,209	2.72	3.51
7960	VEH MNT SHOP ORG	RAD-1	20	20	0	1,932	196.5	0	0	$889	1	0	1	2	$1,213	$0	$8,416	6.94	1.36
7960	VEH MNT SHOP ORG	RAD-2	20	20	0	1,295	131.0	0	0	$593	1	0	1	2	$1,213	$0	$5,613	4.63	2.04
8002	ENL BARRACKS W/O DIN	CV-1	5	9	0	0	3.7	0	0	$15	0	1	0	3	$1,109	$0	$145	0.13	73.04
8002	ENL BARRACKS W/O DIN	DTWP-1	24	22	7	0	0.0	3	0	$262	1	0	1	4	$1,418	$0	$2,236	1.58	5.41
8006	ENL BARRACKS W/O DIN	CV-1	5	9	0	0	3.7	0	0	$15	0	1	0	3	$1,109	$0	$145	0.13	73.04
8006	ENL BARRACKS W/O DIN	DTWP-1	24	22	7	0	0.0	3	0	$262	1	0	1	4	$1,418	$0	$2,236	1.58	5.41
8008	ENL BARRACKS W/O DIN	CV-1	5	9	0	0	1.8	0	0	$8	0	1	0	3	$1,109	$0	$72	0.07	146.07
8008	ENL BARRACKS W/O DIN	DTWP-1	24	22	2	0	0.0	3	0	$135	1	0	1	4	$1,418	$0	$1,151	0.81	10.51

						KWH SVGS. PER YR	SVGS. PER YR	HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	DD PNT	AU PNT	UN PNT	PNT	COST		SAVINGS		
8010	DET DAY ROOM	AHU-1	15	18	2	18,612	45.4	0	0	$1,019	1	0	0	1	$348	$0	$9,068	26.06	0.34
8010	DET DAY ROOM	AHU-1	15	27	0	2,625	20.0	0	0	$191	0	2	0	3	$1,097	$0	$1,738	1.58	5.75
8010	DET DAY ROOM	AHU-1	15	33	0	22	1.4	0	0	$7	0	1	0	0	$272	$0	$62	0.23	41.62
8010	DET DAY ROOM	AHU-1	15	36	0	896	0.0	0	0	$37	0	0	0	2	$399	$0	$325	0.81	10.79
8012	ENL BARRACKS W/O DIN	CV-1	5	9	0	0	3.7	0	0	$15	0	1	0	3	$1,109	$0	$145	0.13	73.04
8012	ENL BARRACKS W/O DIN	DTWP-1	24	22	5	0	0.0	3	0	$190	1	0	1	4	$1,418	$0	$1,619	1.14	7.47
8014	ENL BARRACKS W/O DIN	CV-1	5	9	0	0	1.8	0	0	$8	0	1	0	3	$1,109	$0	$72	0.07	146.07
8014	ENL BARRACKS W/O DIN	DTWP-1	24	22	2	0	0.0	3	0	$135	1	0	1	4	$1,418	$0	$1,151	0.81	10.51
8020	DET DAY ROOM	AHU-1	15	18	2	18,612	45.4	0	0	$1,019	1	0	0	1	$348	$0	$9,068	26.06	0.34
8020	DET DAY ROOM	AHU-1	15	27	0	2,625	20.0	0	0	$191	0	2	0	3	$1,097	$0	$1,738	1.58	5.75
8020	DET DAY ROOM	AHU-1	15	33	0	22	1.4	0	0	$7	0	1	0	0	$272	$0	$62	0.23	41.62
8020	DET DAY ROOM	AHU-1	15	36	0	896	0.0	0	0	$37	0	0	0	2	$399	$0	$325	0.81	10.79
8021	ADMIN & SUPPORT BLDG	CV-1	5	9	0	0	2.6	0	0	$11	0	1	0	3	$1,109	$0	$100	0.09	105.50
8021	ADMIN & SUPPORT BLDG	DTWP-1	24	22	3	10,680	0.0	3	0	$593	1	0	1	4	$1,418	$0	$5,165	3.64	2.39
8021	ADMIN & SUPPORT BLDG	FC-1	19	20	0	33,170	189.3	0	0	$2,150	1	0	1	2	$1,213	$0	$19,461	16.04	0.56
8021	ADMIN & SUPPORT BLDG	HV-1	16	18	0	1,990	64.5	0	0	$348	1	0	0	1	$348	$0	$3,253	9.35	1.00
8021	ADMIN & SUPPORT BLDG	HV-1	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8021	ADMIN & SUPPORT BLDG	HV-2	16	18	0	1,990	64.5	0	0	$348	1	0	0	1	$348	$0	$3,253	9.35	1.00
8021	ADMIN & SUPPORT BLDG	HV-2	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8021	ADMIN & SUPPORT BLDG	HV-3	16	18	0	1,990	64.5	0	0	$348	1	0	0	1	$348	$0	$3,253	9.35	1.00
8021	ADMIN & SUPPORT BLDG	HV-3	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8021	ADMIN & SUPPORT BLDG	HV-4	16	18	0	1,990	64.5	0	0	$348	1	0	0	1	$348	$0	$3,253	9.35	1.00
8021	ADMIN & SUPPORT BLDG	HV-4	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8021	ADMIN & SUPPORT BLDG	HV-5	16	18	0	1,990	64.5	0	0	$348	1	0	0	1	$348	$0	$3,253	9.35	1.00
8021	ADMIN & SUPPORT BLDG	HV-5	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8023	ADMIN & SUPPORT BLDG	CV-1	5	9	0	0	3.3	0	0	$14	0	1	0	3	$1,109	$0	$130	0.12	81.01
8023	ADMIN & SUPPORT BLDG	DTWP-1	24	22	2	5,345	0.0	3	0	$338	1	0	1	4	$1,418	$0	$2,935	2.07	4.20
8023	ADMIN & SUPPORT BLDG	FC-1	19	20	0	29,314	189.3	0	0	$1,991	1	0	1	2	$1,213	$0	$18,063	14.89	0.61
8023	ADMIN & SUPPORT BLDG	HV-1	16	18	0	1,773	64.5	0	0	$339	1	0	0	1	$348	$0	$3,174	9.12	1.03
8023	ADMIN & SUPPORT BLDG	HV-1	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8023	ADMIN & SUPPORT BLDG	HV-2	16	18	0	1,773	64.5	0	0	$339	1	0	0	1	$348	$0	$3,174	9.12	1.03
8023	ADMIN & SUPPORT BLDG	HV-2	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8023	ADMIN & SUPPORT BLDG	HV-3	16	18	0	1,773	64.5	0	0	$339	1	0	0	1	$348	$0	$3,174	9.12	1.03
8023	ADMIN & SUPPORT BLDG	HV-3	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8023	ADMIN & SUPPORT BLDG	HV-4	16	18	0	1,773	64.5	0	0	$339	1	0	0	1	$348	$0	$3,174	9.12	1.03
8023	ADMIN & SUPPORT BLDG	HV-4	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8023	ADMIN & SUPPORT BLDG	HV-5	16	18	0	1,773	64.5	0	0	$339	1	0	0	1	$348	$0	$3,174	9.12	1.03
8023	ADMIN & SUPPORT BLDG	HV-5	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8025	BN ADMIN & CLRM	AHU-1	10	18	1	20,843	0.0	0	0	$891	1	0	0	1	$348	$0	$7,813	22.45	0.39
8025	BN ADMIN & CLRM	AHU-1	10	29	0	1,576	0.0	0	0	$65	0	7	0	8	$3,378	$0	$571	0.17	51.91
8025	BN ADMIN & CLRM	AHU-1	10	33	0	162	0.0	0	0	$7	0	1	0	0	$272	$0	$59	0.22	40.56

[illegible]	[illegible]	[illegible] TYPE	[illegible]	[illegible]	[illegible] PER YR	KWH SVGS PER YR	MBTU SVGS PER YR	LABOR HOUR SVGS PER YR	MATRL SAVGS PER YR	COST SVGS PER YR	[illegible] PNT	[illegible] ENT	[illegible]	[illegible]	[illegible] INSTL COST	[illegible] PER YR	DISC SAVINGS	[illegible]	[illegible]
8025	BN ADMIN & CLRM	AHU-1	10	35	0	537	0.0	0	0	$22	0	0	0	2	$399	$0	$195	0.49	17.99
8025	BN ADMIN & CLRM	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
8025	BN ADMIN & CLRM	AHU-2	10	18	2	36,397	0.0	0	0	$1,547	1	0	0	1	$348	$0	$13,575	39.01	0.22
8025	BN ADMIN & CLRM	AHU-2	10	29	0	2,928	0.0	0	0	$121	0	7	0	8	$3,378	$0	$1,062	0.31	27.94
8025	BN ADMIN & CLRM	AHU-2	10	33	0	201	0.0	0	0	$8	0	1	0	0	$272	$0	$73	0.27	32.74
8025	BN ADMIN & CLRM	AHU-2	10	35	0	998	0.0	0	0	$41	0	0	0	2	$399	$0	$362	0.91	9.68
8025	BN ADMIN & CLRM	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
8025	BN ADMIN & CLRM	AHU-3	10	18	1	20,843	0.0	0	0	$891	1	0	0	1	$348	$0	$7,813	22.45	0.39
8025	BN ADMIN & CLRM	AHU-3	10	29	0	1,576	0.0	0	0	$65	0	7	0	8	$3,378	$0	$571	0.17	51.91
8025	BN ADMIN & CLRM	AHU-3	10	33	0	162	0.0	0	0	$7	0	1	0	0	$272	$0	$59	0.22	40.56
8025	BN ADMIN & CLRM	AHU-3	10	35	0	537	0.0	0	0	$22	0	0	0	2	$399	$0	$195	0.49	17.99
8025	BN ADMIN & CLRM	AHU-3	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
8025	BN ADMIN & CLRM	CV-1	5	9	0	0	4.4	0	0	$18	0	1	0	3	$1,109	$0	$174	0.16	60.86
8025	BN ADMIN & CLRM	CWP-1	26	24	1	2,316	0.0	3	0	$184	1	0	1	0	$386	$0	$1,597	4.14	2.09
8025	BN ADMIN & CLRM	RAD-1	25	23	0	4,976	0.0	3	0	$277	1	0	1	1	$570	$0	$2,418	4.24	2.05
8037	BN ADMIN & CLRM	AHU-1	10	18	1	19,816	0.0	0	0	$848	1	0	0	1	$348	$0	$7,440	21.38	0.41
8037	BN ADMIN & CLRM	AHU-1	10	29	0	1,769	0.0	0	0	$73	0	7	0	8	$3,378	$0	$641	0.19	46.25
8037	BN ADMIN & CLRM	AHU-1	10	33	0	162	0.0	0	0	$7	0	1	0	0	$272	$0	$59	0.22	40.56
8037	BN ADMIN & CLRM	AHU-1	10	35	0	603	0.0	0	0	$25	0	0	0	2	$399	$0	$219	0.55	16.02
8037	BN ADMIN & CLRM	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
8037	BN ADMIN & CLRM	AHU-2	10	18	2	34,597	0.0	0	0	$1,473	1	0	0	1	$348	$0	$12,922	37.13	0.24
8037	BN ADMIN & CLRM	AHU-2	10	29	0	3,286	0.0	0	0	$136	0	7	0	8	$3,378	$0	$1,192	0.35	24.89
8037	BN ADMIN & CLRM	AHU-2	10	33	0	201	0.0	0	0	$8	0	1	0	0	$272	$0	$73	0.27	32.74
8037	BN ADMIN & CLRM	AHU-2	10	35	0	1,120	0.0	0	0	$46	0	0	0	2	$399	$0	$406	1.02	8.62
8037	BN ADMIN & CLRM	AHU-2	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
8037	BN ADMIN & CLRM	AHU-3	10	18	1	19,816	0.0	0	0	$848	1	0	0	1	$348	$0	$7,440	21.38	0.41
8037	BN ADMIN & CLRM	AHU-3	10	29	0	1,769	0.0	0	0	$73	0	7	0	8	$3,378	$0	$641	0.19	46.25
8037	BN ADMIN & CLRM	AHU-3	10	33	0	162	0.0	0	0	$7	0	1	0	0	$272	$0	$59	0.22	40.56
8037	BN ADMIN & CLRM	AHU-3	10	35	0	603	0.0	0	0	$25	0	0	0	2	$399	$0	$219	0.55	16.02
8037	BN ADMIN & CLRM	AHU-3	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
8037	BN ADMIN & CLRM	CV-1	5	8	0	4,743	0.0	0	0	$196	1	0	1	0	$386	$0	$1,720	4.46	1.97
8037	BN ADMIN & CLRM	CV-1	5	9	0	0	4.4	0	0	$18	0	1	0	3	$1,109	$0	$174	0.16	60.86
8037	BN ADMIN & CLRM	CWP-1	26	24	1	2,212	0.0	3	0	$180	1	0	1	0	$386	$0	$1,560	4.04	2.14
8037	BN ADMIN & CLRM	HWP-1	26	24	0	2,659	0.0	3	0	$182	1	0	1	0	$386	$0	$1,578	4.09	2.12
8038	ENL BARRACKS W/O DIN	CV-1	5	9	0	0	3.7	0	0	$15	0	1	0	3	$1,109	$0	$145	0.13	73.04
8038	ENL BARRACKS W/O DIN	DTWP-1	24	22	7	0	0.0	3	0	$262	1	0	1	4	$1,418	$0	$2,236	1.58	5.41
8040	ENL BARRACKS W/O DIN	CV-1	5	9	0	0	1.8	0	0	$8	0	1	0	3	$1,109	$0	$72	0.07	146.07
8040	ENL BARRACKS W/O DIN	DTWP-1	24	22	2	0	0.0	3	0	$135	1	0	1	4	$1,418	$0	$1,151	0.81	10.51
8042	ENL BARRACKS W/O DIN	CV-1	5	9	0	0	3.7	0	0	$15	0	1	0	3	$1,109	$0	$145	0.13	73.04
8042	ENL BARRACKS W/O DIN	DTWP-1	24	22	7	0	0.0	3	0	$262	1	0	1	4	$1,418	$0	$2,236	1.58	5.41
8044	APP INSTR BLDG	AHU-1	15	18	1	2,426	25.6	0	0	$229	1	0	0	1	$348	$0	$2,085	5.99	1.52

8044	APP INSTR BLDG	AHU-1	15	27	0	805	26.8	0	0	$144	0	2	0	3	$1,097	$0	$1,343	1.22	7.64
8044	APP INSTR BLDG	AHU-2	15	18	1	2,426	25.6	0	0	$229	1	0	0	1	$348	$0	$2,085	5.99	1.52
8044	APP INSTR BLDG	AHU-2	15	27	0	805	26.8	0	0	$144	0	2	0	3	$1,097	$0	$1,343	1.22	7.64
8044	APP INSTR BLDG	CH-1	8	17	7	149	0.0	3	0	$260	1	0	1	0	$243	$0	$2,223	9.15	0.93
8046	DET DAY ROOM	AHU-1	15	18	2	18,612	45.4	0	0	$1,019	1	0	0	1	$348	$0	$9,068	26.06	0.34
8046	DET DAY ROOM	AHU-1	15	27	0	2,625	20.0	0	0	$191	0	2	0	3	$1,097	$0	$1,738	1.58	5.75
8046	DET DAY ROOM	AHU-1	15	33	0	22	1.4	0	0	$7	0	1	0	0	$272	$0	$62	0.23	41.62
8046	DET DAY ROOM	AHU-1	15	36	0	896	0.0	0	0	$37	0	0	0	2	$399	$0	$325	0.81	10.79
8048	ENL BARRACKS W/O DIN	CV-1	5	9	0	0	1.8	0	0	$8	0	1	0	3	$1,109	$0	$72	0.07	146.07
8048	ENL BARRACKS W/O DIN	DTWP-1	24	22	2	0	0.0	3	0	$135	1	0	1	4	$1,418	$0	$1,151	0.81	10.51
8050	ENL BARRACKS W/O DIN	CV-1	5	9	0	0	1.8	0	0	$8	0	1	0	3	$1,109	$0	$72	0.07	146.07
8050	ENL BARRACKS W/O DIN	DTWP-1	24	22	2	0	0.0	3	0	$135	1	0	1	4	$1,418	$0	$1,151	0.81	10.51
8052	SR ENL QTRS	CV-1	5	9	0	0	3.7	0	0	$15	0	1	0	3	$1,109	$0	$145	0.13	73.04
8052	SR ENL QTRS	DTWP-1	24	22	7	0	0.0	3	0	$262	1	0	1	4	$1,418	$0	$2,236	1.58	5.41
8054	ENL BARRACKS W/O DIN	CV-1	5	9	0	0	1.8	0	0	$8	0	1	0	3	$1,109	$0	$72	0.07	146.07
8054	ENL BARRACKS W/O DIN	DTWP-1	24	22	2	0	0.0	3	0	$117	1	0	1	4	$1,418	$0	$997	0.70	12.14
8056	DET DAY ROOM	AHU-1	15	18	2	18,612	45.4	0	0	$1,019	1	0	0	1	$348	$0	$9,068	26.06	0.34
8056	DET DAY ROOM	AHU-1	15	27	0	2,625	20.0	0	0	$191	0	2	0	3	$1,097	$0	$1,738	1.58	5.75
8056	DET DAY ROOM	AHU-1	15	33	0	22	1.4	0	0	$7	0	1	0	0	$272	$0	$62	0.23	41.62
8056	DET DAY ROOM	AHU-1	15	36	0	896	0.0	0	0	$37	0	0	0	2	$399	$0	$325	0.81	10.79
8057	ADMIN & SUPPORT BLDG	CV-1	5	9	0	0	2.6	0	0	$11	0	1	0	3	$1,109	$0	$100	0.09	105.50
8057	ADMIN & SUPPORT BLDG	DTWP-1	24	22	2	5,345	0.0	3	0	$338	1	0	1	4	$1,418	$0	$2,935	2.07	4.20
8057	ADMIN & SUPPORT BLDG	FC-1	19	20	0	29,314	189.3	0	0	$1,991	1	0	1	2	$1,213	$0	$18,063	14.89	0.61
8057	ADMIN & SUPPORT BLDG	HV-1	16	18	0	1,773	64.5	0	0	$339	1	0	0	1	$348	$0	$3,174	9.12	1.03
8057	ADMIN & SUPPORT BLDG	HV-1	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8057	ADMIN & SUPPORT BLDG	HV-2	16	18	0	1,773	64.5	0	0	$339	1	0	0	1	$348	$0	$3,174	9.12	1.03
8057	ADMIN & SUPPORT BLDG	HV-2	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8057	ADMIN & SUPPORT BLDG	HV-3	16	18	0	1,773	64.5	0	0	$339	1	0	0	1	$348	$0	$3,174	9.12	1.03
8057	ADMIN & SUPPORT BLDG	HV-3	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8057	ADMIN & SUPPORT BLDG	HV-4	16	18	0	1,773	64.5	0	0	$339	1	0	0	1	$348	$0	$3,174	9.12	1.03
8057	ADMIN & SUPPORT BLDG	HV-4	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8057	ADMIN & SUPPORT BLDG	HV-5	16	18	0	1,773	64.5	0	0	$339	1	0	0	1	$348	$0	$3,174	9.12	1.03
8057	ADMIN & SUPPORT BLDG	HV-5	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8059	ADMIN & SUPPORT BLDG	CV-1	5	9	0	0	3.3	0	0	$14	0	1	0	3	$1,109	$0	$130	0.12	81.01
8059	ADMIN & SUPPORT BLDG	DTWP-1	24	22	2	5,345	0.0	3	0	$338	1	0	1	4	$1,418	$0	$2,935	2.07	4.20
8059	ADMIN & SUPPORT BLDG	FC-1	19	20	0	29,314	189.3	0	0	$1,991	1	0	1	2	$1,213	$0	$18,063	14.89	0.61
8059	ADMIN & SUPPORT BLDG	HV-1	16	18	0	1,773	64.5	0	0	$339	1	0	0	1	$348	$0	$3,174	9.12	1.03
8059	ADMIN & SUPPORT BLDG	HV-1	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8059	ADMIN & SUPPORT BLDG	HV-2	16	18	0	1,773	64.5	0	0	$339	1	0	0	1	$348	$0	$3,174	9.12	1.03
8059	ADMIN & SUPPORT BLDG	HV-2	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8059	ADMIN & SUPPORT BLDG	HV-3	16	18	0	1,773	64.5	0	0	$339	1	0	0	1	$348	$0	$3,174	9.12	1.03

BLDG NO	[illegible]	[illegible]	TYPE	[illegible]	[illegible] PER YR	[illegible] SVGS. PER YR	MBtu SVGS. PER YR	LABOR HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	DO PNT	AO PNT	DI PNT	AI PNT	[illegible] COST	[illegible]	TOTAL DISC. SAVINGS	[illegible]	[illegible]
8059	ADMIN & SUPPORT BLDG	HV-3	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8059	ADMIN & SUPPORT BLDG	HV-4	16	18	0	1,773	64.5	0	0	$339	1	0	0	1	$348	$0	$3,174	9.12	1.03
8059	ADMIN & SUPPORT BLDG	HV-4	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8059	ADMIN & SUPPORT BLDG	HV-5	16	18	0	1,773	64.5	0	0	$339	1	0	0	1	$348	$0	$3,174	9.12	1.03
8059	ADMIN & SUPPORT BLDG	HV-5	16	30	0	0	20.7	0	0	$85	0	1	0	3	$813	$0	$813	1.00	9.53
8063	ENL PERS DIN	AHU-1	10	18	14	66,840	663.4	0	0	$5,855	1	0	0	1	$348	$0	$53,370	153.36	0.06
8063	ENL PERS DIN	AHU-1	10	29	0	17,719	56.2	0	0	$963	0	7	0	8	$3,378	$0	$8,632	2.56	3.51
8063	ENL PERS DIN	AHU-1	10	33	0	825	37.6	0	0	$189	0	1	0	0	$272	$0	$1,775	6.53	1.44
8063	ENL PERS DIN	AHU-1	10	35	0	7,757	0.0	0	0	$320	0	0	0	2	$399	$0	$2,813	7.05	1.25
8063	ENL PERS DIN	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
8063	ENL PERS DIN	AHU-2	16	18	26	59,825	825.8	0	0	$6,544	1	0	0	1	$348	$0	$59,841	171.96	0.05
8063	ENL PERS DIN	AHU-2	16	30	0	0	8.0	0	0	$33	0	1	0	3	$813	$0	$315	0.39	24.59
8063	ENL PERS DIN	CWP-1	26	24	1	2,946	0.0	3	0	$223	1	0	1	0	$386	$0	$1,937	5.02	1.73
8065	CLINIC W/O BEDS	AHU-1	10	18	0	24,422	354.0	0	0	$2,467	1	0	0	1	$348	$0	$22,756	65.39	0.14
8065	CLINIC W/O BEDS	AHU-1	10	29	0	931	64.4	0	0	$304	0	7	0	8	$3,378	$0	$2,864	0.85	11.13
8065	CLINIC W/O BEDS	AHU-1	10	33	0	354	14.7	0	0	$75	0	1	0	0	$272	$0	$706	2.59	3.62
8065	CLINIC W/O BEDS	AHU-1	10	35	0	2,440	0.0	0	0	$101	0	0	0	2	$399	$0	$885	2.22	3.96
8065	CLINIC W/O BEDS	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
8065	CLINIC W/O BEDS	CV-1	5	8	0	6,245	0.0	0	0	$258	1	0	1	0	$386	$0	$2,265	5.87	1.50
8065	CLINIC W/O BEDS	CV-1	5	9	0	0	2.6	0	0	$11	0	1	0	3	$1,109	$0	$100	0.09	105.50
8065	CLINIC W/O BEDS	CWP-1	26	24	1	4,078	0.0	3	0	$270	1	0	1	0	$386	$0	$2,347	6.08	1.43
8069	IN SW POOL/GYM	AHU-1	15	18	5	26,221	152.1	0	0	$1,827	1	0	0	1	$348	$0	$16,484	47.37	0.19
8069	IN SW POOL/GYM	AHU-1	15	27	0	313	3.3	0	0	$27	0	2	0	3	$1,097	$0	$243	0.22	41.33
8069	IN SW POOL/GYM	AHU-1	15	33	0	17	1.7	0	0	$8	0	1	0	0	$272	$0	$71	0.26	36.21
8069	IN SW POOL/GYM	AHU-1	15	36	0	182	0.0	0	0	$8	0	0	0	2	$399	$0	$66	0.17	53.10
8069	IN SW POOL/GYM	AHU-2	15	18	2	12,100	66.7	0	0	$838	1	0	0	1	$348	$0	$7,544	21.68	0.42
8069	IN SW POOL/GYM	AHU-2	15	27	0	128	1.5	0	0	$11	0	2	0	3	$1,097	$0	$104	0.09	96.71
8069	IN SW POOL/GYM	AHU-2	15	33	0	7	0.7	0	0	$3	0	1	0	0	$272	$0	$29	0.11	88.44
8069	IN SW POOL/GYM	AHU-2	15	36	0	74	0.0	0	0	$3	0	0	0	2	$399	$0	$27	0.07	129.69
8069	IN SW POOL/GYM	CV-1	5	8	0	14,053	0.0	0	0	$580	1	0	1	0	$386	$0	$5,096	13.20	0.67
8069	IN SW POOL/GYM	CV-1	5	9	0	0	5.7	0	0	$23	0	1	0	3	$1,109	$0	$223	0.20	47.47
8069	IN SW POOL/GYM	CWP-1	26	24	5	12,445	0.0	3	0	$705	1	0	1	0	$386	$0	$6,139	15.90	0.55
8069	IN SW POOL/GYM	CWP-2	26	24	0	925	0.0	3	0	$119	1	0	1	0	$386	$0	$1,025	2.65	3.24
8069	IN SW POOL/GYM	CWP-3	26	24	0	925	0.0	3	0	$119	1	0	1	0	$386	$0	$1,025	2.65	3.24
8069	IN SW POOL/GYM	HRU-1	17	19	0	19,082	164.0	0	0	$1,464	2	0	0	2	$697	$0	$13,359	19.17	0.48
8069	IN SW POOL/GYM	HRU-1	17	30	0	0	1.5	0	0	$6	0	1	0	3	$813	$0	$60	0.07	128.14
8069	IN SW POOL/GYM	HRU-1	17	33	0	0	13.8	0	0	$57	0	1	0	0	$272	$0	$543	2.00	4.77
8069	IN SW POOL/GYM	HRU-2	17	19	0	19,082	164.0	0	0	$1,464	2	0	0	2	$697	$0	$13,359	19.17	0.48
8069	IN SW POOL/GYM	HRU-2	17	30	0	0	1.5	0	0	$6	0	1	0	3	$813	$0	$60	0.07	128.14
8069	IN SW POOL/GYM	HRU-2	17	33	0	0	13.8	0	0	$57	0	1	0	0	$272	$0	$543	2.00	4.77
8069	IN SW POOL/GYM	HV-1	16	18	0	7,001	267.9	0	0	$1,393	1	0	0	1	$348	$0	$13,059	37.52	0.25

BLDG NO	BLDG NAME	EQUIP TAG	SYS TYPE	EMCS FUNCTION NUMBER	KW SVGS PER YR	KWH SVGS. PER YR	MBTU SVGS PER YR	LABOR HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL CONSTR COST	LABOR COSTS PER YR	TOTAL DISC SAVINGS	SIR	SIMPLE PAYBACK
8069	IN SW POOL/GYM	HV-1	16	30	0	0	3.7	0	0	$15	0	1	0	3	$813	$0	$144	0.18	53.82
8069	IN SW POOL/GYM	HV-1	16	33	0	0	13.8	0	0	$57	0	1	0	0	$272	$0	$543	2.00	4.77
8069	IN SW POOL/GYM	HV-2	16	18	0	7,001	267.9	0	0	$1,393	1	0	0	1	$348	$0	$13,059	37.52	0.25
8069	IN SW POOL/GYM	HV-2	16	30	0	0	3.7	0	0	$15	0	1	0	3	$813	$0	$144	0.18	53.82
8069	IN SW POOL/GYM	HV-2	16	33	0	0	13.8	0	0	$57	0	1	0	0	$272	$0	$543	2.00	4.77
8069	IN SW POOL/GYM	HV-3	16	18	0	7,001	267.9	0	0	$1,393	1	0	0	1	$348	$0	$13,059	37.52	0.25
8069	IN SW POOL/GYM	HV-3	16	30	0	0	3.7	0	0	$15	0	1	0	3	$813	$0	$144	0.18	53.82
8069	IN SW POOL/GYM	HV-3	16	33	0	0	13.8	0	0	$57	0	1	0	0	$272	$0	$543	2.00	4.77
8069	IN SW POOL/GYM	HV-4	16	18	0	7,001	267.9	0	0	$1,393	1	0	0	1	$348	$0	$13,059	37.52	0.25
8069	IN SW POOL/GYM	HV-4	16	30	0	0	3.7	0	0	$15	0	1	0	3	$813	$0	$144	0.18	53.82
8069	IN SW POOL/GYM	HV-4	16	33	0	0	13.8	0	0	$57	0	1	0	0	$272	$0	$543	2.00	4.77
8069	IN SW POOL/GYM	HV-9	17	19	0	14,685	932.5	0	0	$4,448	2	0	0	2	$697	$0	$41,938	60.17	0.16
8069	IN SW POOL/GYM	HV-9	17	30	0	0	4.8	0	0	$20	0	1	0	3	$813	$0	$187	0.23	41.40
8069	IN SW POOL/GYM	RAD-1	27	25	0	0	0.0	3	0	$72	0	1	0	1	$456	$0	$614	1.35	6.33
8071	RGT HQ BUILD	AHU-1	10	18	14	118,971	217.2	0	0	$6,170	1	0	0	1	$348	$0	$54,754	157.34	0.06
8071	RGT HQ BUILD	AHU-1	10	29	0	7,563	76.6	0	0	$628	0	7	0	8	$3,378	$0	$5,750	1.70	5.38
8071	RGT HQ BUILD	AHU-1	10	33	0	98	6.2	0	0	$29	0	1	0	0	$272	$0	$277	1.02	9.26
8071	RGT HQ BUILD	AHU-1	10	35	0	2,580	0.0	0	0	$107	0	0	0	2	$399	$0	$936	2.35	3.74
8071	RGT HQ BUILD	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
8071	RGT HQ BUILD	CWP-1	26	24	1	2,298	0.0	3	0	$184	1	0	1	0	$386	$0	$1,591	4.12	2.10
8100	CONSOLIDATED MNT	AHU-1	15	18	0	5,415	0.0	0	0	$227	1	0	0	1	$348	$0	$1,988	5.71	1.54
8100	CONSOLIDATED MNT	AHU-1	15	27	0	441	0.0	0	0	$18	0	2	0	3	$1,097	$0	$160	0.15	60.27
8100	CONSOLIDATED MNT	AHU-1	15	33	0	16	0.0	0	0	$1	0	1	0	0	$272	$0	$6	0.02	399.41
8100	CONSOLIDATED MNT	AHU-1	15	36	0	150	0.0	0	0	$6	0	0	0	2	$399	$0	$54	0.14	64.30
8100	CONSOLIDATED MNT	AHU-10	15	18	0	22,843	377.9	0	0	$2,501	1	0	0	1	$348	$0	$23,122	66.44	0.14
8100	CONSOLIDATED MNT	AHU-10	15	27	0	0	23.6	0	0	$97	0	2	0	3	$1,097	$0	$925	0.84	11.30
8100	CONSOLIDATED MNT	AHU-10	15	33	0	0	27.1	0	0	$112	0	1	0	0	$272	$0	$1,063	3.91	2.44
8100	CONSOLIDATED MNT	AHU-11	15	18	0	5,130	101.1	0	0	$628	1	0	0	1	$348	$0	$5,829	16.75	0.55
8100	CONSOLIDATED MNT	AHU-11	15	27	0	0	23.6	0	0	$97	0	2	0	3	$1,097	$0	$925	0.84	11.30
8100	CONSOLIDATED MNT	AHU-11	15	33	0	0	5.6	0	0	$23	0	1	0	0	$272	$0	$220	0.81	11.76
8100	CONSOLIDATED MNT	AHU-12	15	18	0	9,612	110.8	0	0	$854	1	0	0	1	$348	$0	$7,837	22.52	0.41
8100	CONSOLIDATED MNT	AHU-12	15	27	0	0	23.6	0	0	$97	0	2	0	3	$1,097	$0	$925	0.84	11.30
8100	CONSOLIDATED MNT	AHU-12	15	33	0	0	6.4	0	0	$26	0	1	0	0	$272	$0	$250	0.92	10.37
8100	CONSOLIDATED MNT	AHU-13	15	18	0	29,499	520.6	0	0	$3,363	1	0	0	1	$348	$0	$31,137	89.47	0.10
8100	CONSOLIDATED MNT	AHU-13	15	27	0	0	94.3	0	0	$388	0	2	0	3	$1,097	$0	$3,701	3.37	2.82
8100	CONSOLIDATED MNT	AHU-13	15	33	0	0	31.5	0	0	$130	0	1	0	0	$272	$0	$1,235	4.54	2.10
8100	CONSOLIDATED MNT	AHU-14	15	18	0	29,499	588.7	0	0	$3,644	1	0	0	1	$348	$0	$33,812	97.16	0.10
8100	CONSOLIDATED MNT	AHU-14	15	27	0	0	47.1	0	0	$194	0	2	0	3	$1,097	$0	$1,850	1.69	5.65
8100	CONSOLIDATED MNT	AHU-14	15	33	0	0	41.2	0	0	$170	0	1	0	0	$272	$0	$1,617	5.94	1.60
8100	CONSOLIDATED MNT	AHU-15	17	19	0	100,552	221.5	0	0	$5,065	2	0	0	2	$697	$0	$45,157	64.79	0.14
8100	CONSOLIDATED MNT	AHU-15	17	30	0	0	95.3	0	0	$393	0	1	0	3	$813	$0	$3,744	4.60	2.07

8100	CONSOLIDATED MNT	AHU-16	17	19	0	24,814	147.6	0	0	$1,633	2	0	0	2	$697	$0	$14,795	21.23	0.43
8100	CONSOLIDATED MNT	AHU-16	17	30	0	0	63.6	0	0	$262	0	1	0	3	$813	$0	$2,496	3.07	3.10
8100	CONSOLIDATED MNT	AHU-17	17	19	0	100,552	221.5	0	0	$5,065	2	0	0	2	$697	$0	$45,157	64.79	0.14
8100	CONSOLIDATED MNT	AHU-17	17	30	0	0	95.3	0	0	$393	0	1	0	3	$813	$0	$3,744	4.60	2.07
8100	CONSOLIDATED MNT	AHU-18	17	19	0	51,624	147.6	0	0	$2,740	2	0	0	2	$697	$0	$24,516	35.17	0.25
8100	CONSOLIDATED MNT	AHU-18	17	30	0	0	63.6	0	0	$262	0	1	0	3	$813	$0	$2,496	3.07	3.10
8100	CONSOLIDATED MNT	AHU-19	17	19	0	100,552	221.5	0	0	$5,065	2	0	0	2	$697	$0	$45,157	64.79	0.14
8100	CONSOLIDATED MNT	AHU-19	17	30	0	0	95.3	0	0	$393	0	1	0	3	$813	$0	$3,744	4.60	2.07
8100	CONSOLIDATED MNT	AHU-2	15	18	0	4,188	0.0	0	0	$176	1	0	0	1	$348	$0	$1,543	4.44	1.98
8100	CONSOLIDATED MNT	AHU-2	15	27	0	333	0.0	0	0	$14	0	2	0	3	$1,097	$0	$121	0.11	79.85
8100	CONSOLIDATED MNT	AHU-2	15	33	0	12	0.0	0	0	$1	0	1	0	0	$272	$0	$5	0.02	529.29
8100	CONSOLIDATED MNT	AHU-2	15	36	0	113	0.0	0	0	$5	0	0	0	2	$399	$0	$41	0.10	85.19
8100	CONSOLIDATED MNT	AHU-20	17	19	0	100,552	221.5	0	0	$5,065	2	0	0	2	$697	$0	$45,157	64.79	0.14
8100	CONSOLIDATED MNT	AHU-20	17	30	0	0	95.3	0	0	$393	0	1	0	3	$813	$0	$3,744	4.60	2.07
8100	CONSOLIDATED MNT	AHU-21	17	19	0	52,547	147.6	0	0	$2,778	2	0	0	2	$697	$0	$24,851	35.65	0.25
8100	CONSOLIDATED MNT	AHU-21	17	30	0	0	63.6	0	0	$262	0	1	0	3	$813	$0	$2,496	3.07	3.10
8100	CONSOLIDATED MNT	AHU-22	17	19	0	72,982	295.3	0	0	$4,231	2	0	0	2	$697	$0	$38,058	54.60	0.16
8100	CONSOLIDATED MNT	AHU-22	17	30	0	0	127.1	0	0	$524	0	1	0	3	$813	$0	$4,992	6.14	1.55
8100	CONSOLIDATED MNT	AHU-23	17	19	0	100,552	295.3	0	0	$5,369	2	0	0	2	$697	$0	$48,055	68.95	0.13
8100	CONSOLIDATED MNT	AHU-23	17	30	0	0	127.1	0	0	$524	0	1	0	3	$813	$0	$4,992	6.14	1.55
8100	CONSOLIDATED MNT	AHU-24	16	18	0	57,458	0.0	0	0	$2,373	1	0	0	1	$348	$0	$20,835	59.87	0.15
8100	CONSOLIDATED MNT	AHU-24	16	30	0	0	253.6	0	0	$1,045	0	1	0	3	$813	$0	$9,959	12.25	0.78
8100	CONSOLIDATED MNT	AHU-24(2)	16	18	0	57,458	0.0	0	0	$2,373	1	0	0	1	$348	$0	$20,835	59.87	0.15
8100	CONSOLIDATED MNT	AHU-24(2)	16	30	0	0	253.6	0	0	$1,045	0	1	0	3	$813	$0	$9,959	12.25	0.78
8100	CONSOLIDATED MNT	AHU-25	16	18	0	15,509	0.0	0	0	$641	1	0	0	1	$348	$0	$5,624	16.16	0.54
8100	CONSOLIDATED MNT	AHU-25	16	30	0	0	101.5	0	0	$418	0	1	0	3	$813	$0	$3,983	4.90	1.95
8100	CONSOLIDATED MNT	AHU-26	16	18	0	43,789	0.0	0	0	$1,809	1	0	0	1	$348	$0	$15,879	45.63	0.19
8100	CONSOLIDATED MNT	AHU-26	16	30	0	0	152.2	0	0	$627	0	1	0	3	$813	$0	$5,975	7.35	1.30
8100	CONSOLIDATED MNT	AHU-27	16	18	0	15,509	0.0	0	0	$641	1	0	0	1	$348	$0	$5,624	16.16	0.54
8100	CONSOLIDATED MNT	AHU-27	16	30	0	0	50.7	0	0	$209	0	1	0	3	$813	$0	$1,992	2.45	3.89
8100	CONSOLIDATED MNT	AHU-3	15	18	0	4,188	0.0	0	0	$176	1	0	0	1	$348	$0	$1,543	4.44	1.98
8100	CONSOLIDATED MNT	AHU-3	15	27	0	333	0.0	0	0	$14	0	2	0	3	$1,097	$0	$121	0.11	79.85
8100	CONSOLIDATED MNT	AHU-3	15	33	0	12	0.0	0	0	$1	0	1	0	0	$272	$0	$5	0.02	529.29
8100	CONSOLIDATED MNT	AHU-3	15	36	0	113	0.0	0	0	$5	0	0	0	2	$399	$0	$41	0.10	85.19
8100	CONSOLIDATED MNT	AHU-4	15	18	0	6,705	0.0	0	0	$280	1	0	0	1	$348	$0	$2,456	7.06	1.24
8100	CONSOLIDATED MNT	AHU-4	15	27	0	554	0.0	0	0	$23	0	2	0	3	$1,097	$0	$201	0.18	47.91
8100	CONSOLIDATED MNT	AHU-4	15	33	0	21	0.0	0	0	$1	0	1	0	0	$272	$0	$8	0.03	317.53
8100	CONSOLIDATED MNT	AHU-4	15	36	0	189	0.0	0	0	$8	0	0	0	2	$399	$0	$69	0.17	51.12
8100	CONSOLIDATED MNT	AHU-5	15	18	0	5,497	36.2	0	0	$384	1	0	0	1	$348	$0	$3,480	10.00	0.91
8100	CONSOLIDATED MNT	AHU-5	15	27	0	396	23.6	0	0	$113	0	2	0	3	$1,097	$0	$1,069	0.97	9.67
8100	CONSOLIDATED MNT	AHU-5	15	33	0	6	0.4	0	0	$2	0	1	0	0	$272	$0	$16	0.06	159.01

8100	CONSOLIDATED MNT	AHU-5	15	36	0	135	0.0	0	0	$6	0	0	0	2	$399	$0	$49	0.12	71.43
8100	CONSOLIDATED MNT	AHU-6	11	18	21	150,006	586.5	0	0	$9,149	1	0	0	1	$348	$0	$82,002	235.64	0.04
8100	CONSOLIDATED MNT	AHU-6	11	32	0	6,585	70.7	0	0	$563	0	3	0	11	$5,344	$0	$5,163	0.97	9.49
8100	CONSOLIDATED MNT	AHU-6	11	33	0	378	23.8	0	0	$114	0	1	0	0	$272	$0	$1,072	3.94	2.39
8100	CONSOLIDATED MNT	AHU-6	11	36	0	2,247	0.0	0	0	$93	0	0	0	2	$399	$0	$815	2.04	4.30
8100	CONSOLIDATED MNT	AHU-6	11	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
8100	CONSOLIDATED MNT	AHU-7	15	18	7	48,067	68.0	0	0	$2,456	1	0	0	1	$348	$0	$21,722	62.42	0.14
8100	CONSOLIDATED MNT	AHU-7	15	27	0	2,072	23.6	0	0	$183	0	2	0	3	$1,097	$0	$1,677	1.53	6.01
8100	CONSOLIDATED MNT	AHU-7	15	33	0	30	1.9	0	0	$9	0	1	0	0	$272	$0	$84	0.31	30.42
8100	CONSOLIDATED MNT	AHU-7	15	36	0	707	0.0	0	0	$29	0	0	0	2	$399	$0	$256	0.64	13.66
8100	CONSOLIDATED MNT	AHU-8	11	18	11	79,368	355.7	0	0	$5,023	1	0	0	1	$348	$0	$45,133	129.69	0.07
8100	CONSOLIDATED MNT	AHU-8	11	32	0	3,442	23.6	0	0	$239	0	3	0	11	$8,366	$0	$2,173	0.26	34.97
8100	CONSOLIDATED MNT	AHU-8	11	33	0	247	15.6	0	0	$74	0	1	0	0	$272	$0	$700	2.57	3.66
8100	CONSOLIDATED MNT	AHU-8	11	36	0	1,174	0.0	0	0	$48	0	0	0	2	$399	$0	$426	1.07	8.23
8100	CONSOLIDATED MNT	AHU-8	11	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
8100	CONSOLIDATED MNT	AHU-9	15	18	0	22,843	357.4	0	0	$2,416	1	0	0	1	$348	$0	$22,316	64.13	0.14
8100	CONSOLIDATED MNT	AHU-9	15	27	0	0	23.6	0	0	$97	0	2	0	3	$1,097	$0	$925	0.84	11.30
8100	CONSOLIDATED MNT	AHU-9	15	33	0	0	25.5	0	0	$105	0	1	0	0	$272	$0	$1,000	3.68	2.59
8100	CONSOLIDATED MNT	BLR-1	1	1	0	1,917	0.0	0	0	$79	2	0	0	0	$277	$0	$695	2.51	3.50
8100	CONSOLIDATED MNT	BLR-1	1	2	0	0	35.6	0	0	$147	0	0	0	3	$836	$0	$1,398	1.67	5.70
8100	CONSOLIDATED MNT	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
8100	CONSOLIDATED MNT	BLR-2	1	1	0	1,917	0.0	0	0	$79	2	0	0	0	$277	$0	$695	2.51	3.50
8100	CONSOLIDATED MNT	BLR-2	1	2	0	0	35.6	0	0	$147	0	0	0	3	$836	$0	$1,398	1.67	5.70
8100	CONSOLIDATED MNT	BLR-2	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
8100	CONSOLIDATED MNT	CH-1	8	17	3	70	0.0	3	0	$161	1	0	1	0	$243	$0	$1,371	5.64	1.51
8100	CONSOLIDATED MNT	CH-2	8	17	3	70	0.0	3	0	$161	1	0	1	0	$243	$0	$1,371	5.64	1.51
8100	CONSOLIDATED MNT	CH-3	8	17	3	53	0.0	3	0	$138	1	0	1	0	$243	$0	$1,182	4.86	1.75
8100	CONSOLIDATED MNT	CH-4	8	17	3	53	0.0	3	0	$138	1	0	1	0	$243	$0	$1,182	4.86	1.75
8100	CONSOLIDATED MNT	CH-5	8	17	3	53	0.0	3	0	$138	1	0	1	0	$243	$0	$1,182	4.86	1.75
8100	CONSOLIDATED MNT	CH-6	6	10	1	4,231	0.0	0	0	$205	1	0	1	0	$386	$0	$1,789	4.63	1.89
8100	CONSOLIDATED MNT	CH-6	6	11	0	525	0.0	0	0	$22	0	0	0	2	$664	$0	$190	0.29	30.62
8100	CONSOLIDATED MNT	CH-6	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
8100	CONSOLIDATED MNT	CH-6	6	42	25	0	0.0	0	0	$643	1	0	0	0	$150	$0	$5,487	36.58	0.23
8100	CONSOLIDATED MNT	CH-7	8	17	13	263	0.0	3	0	$404	1	0	1	0	$243	$0	$3,453	14.21	0.60
8100	CONSOLIDATED MNT	CH-8	6	10	1	4,231	0.0	0	0	$205	1	0	1	0	$386	$0	$1,789	4.63	1.89
8100	CONSOLIDATED MNT	CH-8	6	11	0	420	0.0	0	0	$17	0	0	0	2	$664	$0	$152	0.23	38.28
8100	CONSOLIDATED MNT	CH-8	6	16	0	0	0.0	4	0	$96	0	0	2	0	$281	$0	$819	2.91	2.93
8100	CONSOLIDATED MNT	CH-8	6	42	20	0	0.0	0	0	$515	1	0	0	0	$150	$0	$4,389	29.26	0.29
8100	CONSOLIDATED MNT	HWP-1	26	24	0	29,499	0.0	3	0	$1,290	1	0	1	0	$386	$0	$11,311	29.30	0.30
8100	CONSOLIDATED MNT	HWP-2	26	24	0	29,499	0.0	3	0	$1,290	1	0	1	0	$386	$0	$11,311	29.30	0.30
8100	CONSOLIDATED MNT	HWP-3	26	24	0	22,843	0.0	3	0	$1,015	1	0	1	0	$386	$0	$8,897	23.05	0.38

[illegible]	BLDG NAME	EQUIP TAG	SYS TYPE	[illegible] FUNCTN NUMBER	[illegible] SVGS. PER YR	KWH SVGS. PER YR	MBtu SVGS. PER YR	LABOR HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL CONSTR COST	[illegible] COST PER YR	TOTAL DISC SAVINGS	[illegible]	[illegible] PAYBACK
8100	CONSOLIDATED MNT	HWP-4	26	24	0	43,789	0.0	3	0	$1,881	1	0	1	0	$386	$0	$16,493	42.73	0.21
8100	CONSOLIDATED MNT	HWP-5	26	24	0	43,789	0.0	3	0	$1,881	1	0	1	0	$386	$0	$16,493	42.73	0.21
8100	CONSOLIDATED MNT	UH-1	21	20	0	3,559	369.1	0	0	$1,668	1	0	1	2	$1,213	$0	$15,783	13.01	0.73
8100	CONSOLIDATED MNT	UH-2	21	20	0	9,612	590.6	0	0	$2,830	1	0	1	2	$1,213	$0	$26,673	21.99	0.43
8100	CONSOLIDATED MNT	UH-3	21	20	0	23,728	885.9	0	0	$4,630	1	0	1	2	$1,213	$0	$43,386	35.77	0.26
8100	CONSOLIDATED MNT	UH-4	21	20	0	3,559	442.9	0	0	$1,972	1	0	1	2	$1,213	$0	$18,681	15.40	0.62
8100	CONSOLIDATED MNT	UH-5	21	20	0	7,119	442.9	0	0	$2,119	1	0	1	2	$1,213	$0	$19,972	16.47	0.57
8100	CONSOLIDATED MNT	UH-6	21	20	0	9,491	147.6	0	0	$1,000	1	0	1	2	$1,213	$0	$9,239	7.62	1.21
8100	CONSOLIDATED MNT	UH-7	21	20	0	2,876	147.6	0	0	$727	1	0	1	2	$1,213	$0	$6,840	5.64	1.67
8100	CONSOLIDATED MNT	UH-8	21	20	0	973	73.8	0	0	$344	1	0	1	2	$1,213	$0	$3,251	2.68	3.52
8300	VEH MNT SHOP ORG	AHU-1	15	18	0	3,685	58.1	0	0	$392	1	0	0	1	$348	$0	$3,617	10.39	0.89
8300	VEH MNT SHOP ORG	AHU-1	15	27	0	0	25.0	0	0	$103	0	2	0	3	$1,097	$0	$982	0.90	10.65
8300	VEH MNT SHOP ORG	AHU-2	15	18	0	1,932	41.5	0	0	$251	1	0	0	1	$348	$0	$2,330	6.69	1.39
8300	VEH MNT SHOP ORG	AHU-2	15	27	0	0	17.9	0	0	$74	0	2	0	3	$1,097	$0	$701	0.64	14.90
8300	VEH MNT SHOP ORG	AHU-3	15	18	0	1,932	41.5	0	0	$251	1	0	0	1	$348	$0	$2,330	6.69	1.39
8300	VEH MNT SHOP ORG	AHU-3	15	27	0	0	17.9	0	0	$74	0	2	0	3	$1,097	$0	$701	0.64	14.90
8300	VEH MNT SHOP ORG	AHU-4	15	18	0	1,932	41.5	0	0	$251	1	0	0	1	$348	$0	$2,330	6.69	1.39
8300	VEH MNT SHOP ORG	AHU-4	15	27	0	0	17.9	0	0	$74	0	2	0	3	$1,097	$0	$701	0.64	14.90
8300	VEH MNT SHOP ORG	AHU-5	15	18	0	1,932	49.8	0	0	$285	1	0	0	1	$348	$0	$2,656	7.63	1.22
8300	VEH MNT SHOP ORG	AHU-5	15	27	0	0	21.4	0	0	$88	0	2	0	3	$1,097	$0	$842	0.77	12.42
8300	VEH MNT SHOP ORG	AHU-6	15	18	0	5,169	107.9	0	0	$658	1	0	0	1	$348	$0	$6,111	17.56	0.53
8300	VEH MNT SHOP ORG	AHU-6	15	27	0	0	46.5	0	0	$191	0	2	0	3	$1,097	$0	$1,824	1.66	5.73
8300	VEH MNT SHOP ORG	MAU-1	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29
8300	VEH MNT SHOP ORG	MAU-1	16	30	0	0	28.5	0	0	$117	0	1	0	3	$813	$0	$1,120	1.38	6.92
8300	VEH MNT SHOP ORG	MAU-2	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29
8300	VEH MNT SHOP ORG	MAU-2	16	30	0	0	28.5	0	0	$117	0	1	0	3	$813	$0	$1,120	1.38	6.92
8300	VEH MNT SHOP ORG	MAU-3	16	18	0	23,016	0.0	0	0	$951	1	0	0	1	$348	$0	$8,346	23.98	0.37
8300	VEH MNT SHOP ORG	MAU-3	16	30	0	0	57.0	0	0	$235	0	1	0	3	$813	$0	$2,239	2.75	3.46
8300	VEH MNT SHOP ORG	RAD-1	20	20	0	1,932	199.2	0	0	$900	1	0	1	2	$1,213	$0	$8,521	7.02	1.35
8300	VEH MNT SHOP ORG	RAD-2	20	20	0	1,295	132.8	0	0	$601	1	0	1	2	$1,213	$0	$5,683	4.69	2.02
8320	VEH MNT SHOP ORG	AHU-1	15	18	0	3,685	58.1	0	0	$392	1	0	0	1	$348	$0	$3,617	10.39	0.89
8320	VEH MNT SHOP ORG	AHU-1	15	27	0	0	25.0	0	0	$103	0	2	0	3	$1,097	$0	$982	0.90	10.65
8320	VEH MNT SHOP ORG	AHU-2	15	18	0	1,932	41.5	0	0	$251	1	0	0	1	$348	$0	$2,330	6.69	1.39
8320	VEH MNT SHOP ORG	AHU-2	15	27	0	0	17.9	0	0	$74	0	2	0	3	$1,097	$0	$701	0.64	14.90
8320	VEH MNT SHOP ORG	AHU-3	15	18	0	1,932	41.5	0	0	$251	1	0	0	1	$348	$0	$2,330	6.69	1.39
8320	VEH MNT SHOP ORG	AHU-3	15	27	0	0	17.9	0	0	$74	0	2	0	3	$1,097	$0	$701	0.64	14.90
8320	VEH MNT SHOP ORG	AHU-4	15	18	0	1,932	41.5	0	0	$251	1	0	0	1	$348	$0	$2,330	6.69	1.39
8320	VEH MNT SHOP ORG	AHU-4	15	27	0	0	17.9	0	0	$74	0	2	0	3	$1,097	$0	$701	0.64	14.90
8320	VEH MNT SHOP ORG	AHU-5	15	18	0	1,932	49.8	0	0	$285	1	0	0	1	$348	$0	$2,656	7.63	1.22
8320	VEH MNT SHOP ORG	AHU-5	15	27	0	0	21.4	0	0	$88	0	2	0	3	$1,097	$0	$842	0.77	12.42
8320	VEH MNT SHOP ORG	AHU-6	15	18	0	5,169	107.9	0	0	$658	1	0	0	1	$348	$0	$6,111	17.56	0.53

[illegible]	[illegible]	[illegible]	TYPE	[illegible] NUMBER	KW SVGS PER YR	KWH SVGS PER YR	MBtu SVGS PER YR	LABOR HOUR SVGS PER YR	MATRL SAVGS PER YR	COST SVGS PER YR	DO PNT	AQ PNT	DH PNT	AI PNT	[illegible] CONSTR COST	[illegible] PER YR	[illegible] SAVINGS	[illegible]	[illegible]
8320	VEH MNT SHOP ORG	AHU-6	15	27	0	0	46.5	0	0	$191	0	2	0	3	$1,097	$0	$1,824	1.66	5.73
8320	VEH MNT SHOP ORG	MAU-1	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29
8320	VEH MNT SHOP ORG	MAU-1	16	30	0	0	28.5	0	0	$117	0	1	0	3	$813	$0	$1,120	1.38	6.92
8320	VEH MNT SHOP ORG	MAU-2	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29
8320	VEH MNT SHOP ORG	MAU-2	16	30	0	0	28.5	0	0	$117	0	1	0	3	$813	$0	$1,120	1.38	6.92
8320	VEH MNT SHOP ORG	MAU-3	16	18	0	23,016	0.0	0	0	$951	1	0	0	1	$348	$0	$8,346	23.98	0.37
8320	VEH MNT SHOP ORG	MAU-3	16	30	0	0	57.0	0	0	$235	0	1	0	3	$813	$0	$2,239	2.75	3.46
8320	VEH MNT SHOP ORG	RAD-1	20	20	0	1,932	199.2	0	0	$900	1	0	1	2	$1,213	$0	$8,521	7.02	1.35
8320	VEH MNT SHOP ORG	RAD-2	20	20	0	1,295	132.8	0	0	$601	1	0	1	2	$1,213	$0	$5,683	4.69	2.02
8330	VEH MNT SHOP ORG	ACCU-1	8	17	7	140	0.0	3	0	$249	1	0	1	0	$243	$0	$2,128	8.76	0.97
8330	VEH MNT SHOP ORG	AHU-1	15	18	3	32,464	130.4	0	0	$1,957	1	0	0	1	$348	$0	$17,569	50.49	0.18
8330	VEH MNT SHOP ORG	AHU-1	15	27	0	1,763	77.1	0	0	$390	0	2	0	3	$1,097	$0	$3,665	3.34	2.81
8330	VEH MNT SHOP ORG	AHU-1	15	33	0	27	1.7	0	0	$8	0	1	0	0	$272	$0	$77	0.28	33.45
8330	VEH MNT SHOP ORG	AHU-1	15	36	0	602	0.0	0	0	$25	0	0	0	2	$399	$0	$218	0.55	16.06
8330	VEH MNT SHOP ORG	BLR-1	1	1	0	68,069	0.0	0	0	$2,811	2	0	0	0	$277	$0	$24,683	89.11	0.10
8330	VEH MNT SHOP ORG	BLR-1	1	2	0	0	16.4	0	0	$68	0	0	0	3	$836	$0	$645	0.77	12.35
8330	VEH MNT SHOP ORG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
8330	VEH MNT SHOP ORG	HV-1	16	18	0	6,637	177.6	0	0	$1,006	1	0	0	1	$348	$0	$9,381	26.96	0.35
8330	VEH MNT SHOP ORG	HV-1	16	30	0	0	51.4	0	0	$212	0	1	0	3	$813	$0	$2,017	2.48	3.84
8330	VEH MNT SHOP ORG	HV-1	16	33	0	0	8.7	0	0	$36	0	1	0	0	$272	$0	$342	1.26	7.58
8330	VEH MNT SHOP ORG	HWP-1	26	24	0	23,360	0.0	3	0	$1,037	1	0	1	0	$386	$0	$9,085	23.54	0.37
8330	VEH MNT SHOP ORG	MAU-1	16	18	0	6,637	0.0	0	0	$274	1	0	0	1	$348	$0	$2,407	6.92	1.27
8330	VEH MNT SHOP ORG	MAU-1	16	30	0	0	55.3	0	0	$228	0	1	0	3	$813	$0	$2,171	2.67	3.57
8330	VEH MNT SHOP ORG	MAU-2	16	18	0	6,637	0.0	0	0	$274	1	0	0	1	$348	$0	$2,407	6.92	1.27
8330	VEH MNT SHOP ORG	MAU-2	16	30	0	0	55.3	0	0	$228	0	1	0	3	$813	$0	$2,171	2.67	3.57
8330	VEH MNT SHOP ORG	UH-1	21	20	0	6,875	482.9	0	0	$2,273	1	0	1	2	$1,213	$0	$21,453	17.69	0.53
8330	VEH MNT SHOP ORG	UH-2	21	20	0	6,637	563.4	0	0	$2,595	1	0	1	2	$1,213	$0	$24,526	20.22	0.47
8340	VEH MNT SHOP ORG	AHU-1	15	18	0	3,685	58.1	0	0	$392	1	0	0	1	$348	$0	$3,617	10.39	0.89
8340	VEH MNT SHOP ORG	AHU-1	15	27	0	0	25.0	0	0	$103	0	2	0	3	$1,097	$0	$982	0.90	10.65
8340	VEH MNT SHOP ORG	AHU-2	15	18	0	1,932	41.5	0	0	$251	1	0	0	1	$348	$0	$2,330	6.69	1.39
8340	VEH MNT SHOP ORG	AHU-2	15	27	0	0	17.9	0	0	$74	0	2	0	3	$1,097	$0	$701	0.64	14.90
8340	VEH MNT SHOP ORG	AHU-3	15	18	0	1,932	41.5	0	0	$251	1	0	0	1	$348	$0	$2,330	6.69	1.39
8340	VEH MNT SHOP ORG	AHU-3	15	27	0	0	17.9	0	0	$74	0	2	0	3	$1,097	$0	$701	0.64	14.90
8340	VEH MNT SHOP ORG	AHU-4	15	18	0	1,932	41.5	0	0	$251	1	0	0	1	$348	$0	$2,330	6.69	1.39
8340	VEH MNT SHOP ORG	AHU-4	15	27	0	0	17.9	0	0	$74	0	2	0	3	$1,097	$0	$701	0.64	14.90
8340	VEH MNT SHOP ORG	AHU-5	15	18	0	1,932	49.8	0	0	$285	1	0	0	1	$348	$0	$2,656	7.63	1.22
8340	VEH MNT SHOP ORG	AHU-5	15	27	0	0	21.4	0	0	$88	0	2	0	3	$1,097	$0	$842	0.77	12.42
8340	VEH MNT SHOP ORG	AHU-6	15	18	0	5,169	107.9	0	0	$658	1	0	0	1	$348	$0	$6,111	17.56	0.53
8340	VEH MNT SHOP ORG	AHU-6	15	27	0	0	46.5	0	0	$191	0	2	0	3	$1,097	$0	$1,824	1.66	5.73
8340	VEH MNT SHOP ORG	MAU-1	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29
8340	VEH MNT SHOP ORG	MAU-1	16	30	0	0	28.5	0	0	$117	0	1	0	3	$813	$0	$1,120	1.38	6.92

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	KWH SVGS. PER YR	MBTU SVGS. PER YR	LABOR HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	DO PNT	AC PNT	DI PNT	XI PNT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8340	VEH MNT SHOP ORG	MAU-2	16	18	0	6,539	0.0	0	0	$270	1	0	0	1	$348	$0	$2,371	6.81	1.29
8340	VEH MNT SHOP ORG	MAU-2	16	30	0	0	28.5	0	0	$117	0	1	0	3	$813	$0	$1,120	1.38	6.92
8340	VEH MNT SHOP ORG	MAU-3	16	18	0	23,016	0.0	0	0	$951	1	0	0	1	$348	$0	$8,346	23.98	0.37
8340	VEH MNT SHOP ORG	MAU-3	16	30	0	0	57.0	0	0	$235	0	1	0	3	$813	$0	$2,239	2.75	3.46
8340	VEH MNT SHOP ORG	RAD-1	20	20	0	1,932	199.2	0	0	$900	1	0	1	2	$1,213	$0	$8,521	7.02	1.35
8340	VEH MNT SHOP ORG	RAD-2	20	20	0	1,295	132.8	0	0	$601	1	0	1	2	$1,213	$0	$5,683	4.69	2.02
8360	VEH MNT SHOP ORG	ACCU-1	8	17	6	123	0.0	3	0	$227	1	0	1	0	$243	$0	$1,939	7.98	1.07
8360	VEH MNT SHOP ORG	AHU-1	10	18	0	6,490	76.4	0	0	$583	1	0	0	1	$348	$0	$5,355	15.39	0.60
8360	VEH MNT SHOP ORG	AHU-1	10	29	0	0	21.3	0	0	$88	0	7	0	8	$3,378	$0	$836	0.25	38.49
8360	VEH MNT SHOP ORG	AHU-1	10	33	0	0	3.9	0	0	$16	0	1	0	0	$272	$0	$154	0.57	16.86
8360	VEH MNT SHOP ORG	AHU-1	10	40	0	0	0.0	5	0	$120	0	0	1	0	$112	$0	$1,024	9.14	0.93
8360	VEH MNT SHOP ORG	BLR-1	1	1	0	29,499	0.0	0	0	$1,218	2	0	0	0	$277	$0	$10,697	38.62	0.23
8360	VEH MNT SHOP ORG	BLR-1	1	2	0	0	31.4	0	0	$129	0	0	0	3	$836	$0	$1,233	1.47	6.46
8360	VEH MNT SHOP ORG	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
8360	VEH MNT SHOP ORG	HV-1	16	18	0	5,130	83.4	0	0	$556	1	0	0	1	$348	$0	$5,135	14.76	0.63
8360	VEH MNT SHOP ORG	HV-1	16	30	0	0	35.9	0	0	$148	0	1	0	3	$813	$0	$1,410	1.73	5.49
8360	VEH MNT SHOP ORG	HV-2	16	18	0	6,490	83.4	0	0	$612	1	0	0	1	$348	$0	$5,628	16.17	0.57
8360	VEH MNT SHOP ORG	HV-2	16	30	0	0	35.9	0	0	$148	0	1	0	3	$813	$0	$1,410	1.73	5.49
8360	VEH MNT SHOP ORG	HV-3	16	18	0	6,490	83.4	0	0	$612	1	0	0	1	$348	$0	$5,628	16.17	0.57
8360	VEH MNT SHOP ORG	HV-3	16	30	0	0	35.9	0	0	$148	0	1	0	3	$813	$0	$1,410	1.73	5.49
8360	VEH MNT SHOP ORG	HV-4	16	18	0	6,490	83.4	0	0	$612	1	0	0	1	$348	$0	$5,628	16.17	0.57
8360	VEH MNT SHOP ORG	HV-4	16	30	0	0	35.9	0	0	$148	0	1	0	3	$813	$0	$1,410	1.73	5.49
8360	VEH MNT SHOP ORG	HV-5	16	18	0	6,490	83.4	0	0	$612	1	0	0	1	$348	$0	$5,628	16.17	0.57
8360	VEH MNT SHOP ORG	HV-5	16	30	0	0	35.9	0	0	$148	0	1	0	3	$813	$0	$1,410	1.73	5.49
8360	VEH MNT SHOP ORG	HV-6	16	18	0	9,612	100.1	0	0	$809	1	0	0	1	$348	$0	$7,415	21.31	0.43
8360	VEH MNT SHOP ORG	HV-6	16	30	0	0	43.1	0	0	$178	0	1	0	3	$813	$0	$1,692	2.08	4.58
8360	VEH MNT SHOP ORG	RAD-1	20	20	0	1,917	600.6	0	0	$2,554	1	0	1	2	$1,213	$0	$24,276	20.01	0.48
8360	VEH MNT SHOP ORG	RAD-2	20	20	0	1,285	400.4	0	0	$1,703	1	0	1	2	$1,213	$0	$16,186	13.34	0.71
8370	VEH MNT SHOP ORG	AHU-1	15	18	2	22,163	83.1	0	0	$1,320	1	0	0	1	$348	$0	$11,835	34.01	0.26
8370	VEH MNT SHOP ORG	AHU-1	15	27	0	1,112	49.2	0	0	$249	0	2	0	3	$1,097	$0	$2,337	2.13	4.41
8370	VEH MNT SHOP ORG	AHU-1	15	33	0	17	1.1	0	0	$5	0	1	0	0	$272	$0	$48	0.18	52.88
8370	VEH MNT SHOP ORG	AHU-1	15	36	0	380	0.0	0	0	$16	0	0	0	2	$399	$0	$138	0.34	25.45
8370	VEH MNT SHOP ORG	AHU-2	15	18	2	17,576	107.8	0	0	$1,215	1	0	0	1	$348	$0	$10,986	31.57	0.29
8370	VEH MNT SHOP ORG	AHU-2	15	27	0	893	45.7	0	0	$225	0	2	0	3	$1,097	$0	$2,119	1.93	4.87
8370	VEH MNT SHOP ORG	AHU-2	15	33	0	38	2.4	0	0	$12	0	1	0	0	$272	$0	$109	0.40	23.53
8370	VEH MNT SHOP ORG	AHU-2	15	36	0	305	0.0	0	0	$13	0	0	0	2	$399	$0	$110	0.28	31.71
8370	VEH MNT SHOP ORG	CH-1	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
8370	VEH MNT SHOP ORG	CH-2	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
8370	VEH MNT SHOP ORG	CV-1	5	8	0	9,829	0.0	0	0	$406	1	0	1	0	$386	$0	$3,564	9.23	0.95
8370	VEH MNT SHOP ORG	CV-1	5	9	0	0	2.3	0	0	$9	0	1	0	3	$1,109	$0	$89	0.08	118.68
8370	VEH MNT SHOP ORG	HV-1	16	18	0	3,740	94.7	0	0	$545	1	0	0	1	$348	$0	$5,074	14.58	0.64

[illegible]	[illegible]	EQUIP TAG	SYS TYPE	[illegible] NUMBER	KW SVGS. PER YR	KWH SVGS. PER YR	[illegible] SVGS. PER YR	LABOR HR SVGS. PER YR	MATL SAVGS. PER YR	COST SVGS. PER YR	DDC PNT	AO PNT	DI PNT	AI PNT	TOTAL CONSTR. COST	[illegible] PER YR	[illegible] SAVINGS	[illegible]	[illegible]
8370	VEH MNT SHOP ORG	HV-1	16	30	0	0	52.8	0	0	$217	0	1	0	3	$813	$0	$2,072	2.55	3.74
8370	VEH MNT SHOP ORG	HV-1	16	33	0	0	2.3	0	0	$10	0	1	0	0	$272	$0	$91	0.33	28.60
8370	VEH MNT SHOP ORG	HV-2	16	18	0	3,740	143.3	0	0	$745	1	0	0	1	$348	$0	$6,981	20.06	0.47
8370	VEH MNT SHOP ORG	HV-2	16	30	0	0	61.7	0	0	$254	0	1	0	3	$813	$0	$2,422	2.98	3.20
8370	VEH MNT SHOP ORG	MAU-1	16	18	0	6,637	0.0	0	0	$274	1	0	0	1	$348	$0	$2,407	6.92	1.27
8370	VEH MNT SHOP ORG	MAU-1	16	30	0	0	37.9	0	0	$156	0	1	0	3	$813	$0	$1,487	1.83	5.21
8370	VEH MNT SHOP ORG	RAD-1	20	20	0	1,961	440.8	0	0	$1,897	1	0	1	2	$1,213	$0	$18,018	14.85	0.64
8380	VEH MNT SHOP ORG	AHU-1	15	18	2	21,654	33.9	0	0	$1,097	1	0	0	1	$348	$0	$9,721	27.93	0.32
8380	VEH MNT SHOP ORG	AHU-1	15	27	0	1,072	9.5	0	0	$84	0	2	0	3	$1,097	$0	$763	0.70	13.13
8380	VEH MNT SHOP ORG	AHU-1	15	33	0	16	1.0	0	0	$5	0	1	0	0	$272	$0	$47	0.17	54.90
8380	VEH MNT SHOP ORG	AHU-1	15	36	0	366	0.0	0	0	$15	0	0	0	2	$399	$0	$133	0.33	26.42
8380	VEH MNT SHOP ORG	AHU-2	15	18	3	20,046	13.9	0	0	$965	1	0	0	1	$348	$0	$8,493	24.40	0.36
8380	VEH MNT SHOP ORG	AHU-2	15	27	0	776	4.8	0	0	$52	0	2	0	3	$1,097	$0	$468	0.43	21.23
8380	VEH MNT SHOP ORG	AHU-2	15	33	0	6	0.4	0	0	$2	0	1	0	0	$272	$0	$17	0.06	151.69
8380	VEH MNT SHOP ORG	AHU-2	15	36	0	265	0.0	0	0	$11	0	0	0	2	$399	$0	$96	0.24	36.51
8380	VEH MNT SHOP ORG	AHU-3	15	18	2	21,654	33.9	0	0	$1,097	1	0	0	1	$348	$0	$9,721	27.93	0.32
8380	VEH MNT SHOP ORG	AHU-3	15	27	0	1,072	9.5	0	0	$84	0	2	0	3	$1,097	$0	$763	0.70	13.13
8380	VEH MNT SHOP ORG	AHU-3	15	33	0	16	1.0	0	0	$5	0	1	0	0	$272	$0	$47	0.17	54.90
8380	VEH MNT SHOP ORG	AHU-3	15	36	0	366	0.0	0	0	$15	0	0	0	2	$399	$0	$133	0.33	26.42
8380	VEH MNT SHOP ORG	AHU-4	15	18	2	22,575	35.5	0	0	$1,141	1	0	0	1	$348	$0	$10,116	29.07	0.30
8380	VEH MNT SHOP ORG	AHU-4	15	27	0	1,146	9.5	0	0	$87	0	2	0	3	$1,097	$0	$790	0.72	12.67
8380	VEH MNT SHOP ORG	AHU-4	15	33	0	18	1.1	0	0	$5	0	1	0	0	$272	$0	$50	0.18	51.35
8380	VEH MNT SHOP ORG	AHU-4	15	36	0	391	0.0	0	0	$16	0	0	0	2	$399	$0	$142	0.36	24.72
8380	VEH MNT SHOP ORG	AHU-5	15	18	2	22,762	23.9	0	0	$1,101	1	0	0	1	$348	$0	$9,727	27.95	0.32
8380	VEH MNT SHOP ORG	AHU-5	15	27	0	1,176	9.5	0	0	$88	0	2	0	3	$1,097	$0	$801	0.73	12.49
8380	VEH MNT SHOP ORG	AHU-5	15	33	0	9	0.6	0	0	$3	0	1	0	0	$272	$0	$26	0.09	100.03
8380	VEH MNT SHOP ORG	AHU-5	15	36	0	401	0.0	0	0	$17	0	0	0	2	$399	$0	$146	0.36	24.07
8380	VEH MNT SHOP ORG	AHU-6	15	18	21	70,986	201.3	0	0	$4,298	1	0	0	1	$348	$0	$38,224	109.84	0.08
8380	VEH MNT SHOP ORG	AHU-6	15	27	0	0	28.6	0	0	$118	0	2	0	3	$1,097	$0	$1,123	1.02	9.31
8380	VEH MNT SHOP ORG	AHU-6	15	33	0	0	7.7	0	0	$32	0	1	0	0	$272	$0	$304	1.12	8.54
8380	VEH MNT SHOP ORG	AHU-7	15	18	14	47,821	103.4	0	0	$2,762	1	0	0	1	$348	$0	$24,483	70.35	0.13
8380	VEH MNT SHOP ORG	AHU-7	15	27	0	0	23.8	0	0	$98	0	2	0	3	$1,097	$0	$936	0.85	11.17
8380	VEH MNT SHOP ORG	AHU-7	15	33	0	0	3.5	0	0	$14	0	1	0	0	$272	$0	$136	0.50	19.12
8380	VEH MNT SHOP ORG	CH-1	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
8380	VEH MNT SHOP ORG	CH-2	8	17	3	53	0.0	3	0	$138	1	0	1	0	$243	$0	$1,182	4.86	1.75
8380	VEH MNT SHOP ORG	CH-3	8	17	5	96	0.0	3	0	$194	1	0	1	0	$243	$0	$1,655	6.81	1.25
8380	VEH MNT SHOP ORG	CH-4	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
8380	VEH MNT SHOP ORG	CH-5	8	17	3	70	0.0	3	0	$161	1	0	1	0	$243	$0	$1,371	5.64	1.51
8380	VEH MNT SHOP ORG	MAU-1	16	18	0	23,360	0.0	0	0	$965	1	0	0	1	$348	$0	$8,471	24.34	0.36
8380	VEH MNT SHOP ORG	MAU-1	16	30	0	0	41.0	0	0	$169	0	1	0	3	$813	$0	$1,611	1.98	4.81
8380	VEH MNT SHOP ORG	MAU-2	16	18	0	23,360	0.0	0	0	$965	1	0	0	1	$348	$0	$8,471	24.34	0.36

8380	VEH MNT SHOP ORG	MAU-2	16	30	0	0	41.0	0	0	$169	0	1	0	3	$813	$0	$1,611	1.98	4.81
8380	VEH MNT SHOP ORG	MAU-3	16	18	0	9,829	0.0	0	0	$406	1	0	0	1	$348	$0	$3,564	10.24	0.86
8380	VEH MNT SHOP ORG	MAU-3	16	30	0	0	20.5	0	0	$85	0	1	0	3	$813	$0	$806	0.99	9.62
8380	VEH MNT SHOP ORG	MAU-4	16	18	0	9,829	0.0	0	0	$406	1	0	0	1	$348	$0	$3,564	10.24	0.86
8380	VEH MNT SHOP ORG	MAU-4	16	30	0	0	20.5	0	0	$85	0	1	0	3	$813	$0	$806	0.99	9.62
8380	VEH MNT SHOP ORG	MAU-5	16	18	0	23,360	0.0	0	0	$965	1	0	0	1	$348	$0	$8,471	24.34	0.36
8380	VEH MNT SHOP ORG	MAU-5	16	30	0	0	41.0	0	0	$169	0	1	0	3	$813	$0	$1,611	1.98	4.81
8380	VEH MNT SHOP ORG	MAU-6	16	18	0	23,360	0.0	0	0	$965	1	0	0	1	$348	$0	$8,471	24.34	0.36
8380	VEH MNT SHOP ORG	MAU-6	16	30	0	0	41.0	0	0	$169	0	1	0	3	$813	$0	$1,611	1.98	4.81
8380	VEH MNT SHOP ORG	MAU-7	16	18	0	15,860	0.0	0	0	$655	1	0	0	1	$348	$0	$5,751	16.53	0.53
8380	VEH MNT SHOP ORG	MAU-7	16	30	0	0	20.5	0	0	$85	0	1	0	3	$813	$0	$806	0.99	9.62
8380	VEH MNT SHOP ORG	MAU-8	16	18	0	15,860	0.0	0	0	$655	1	0	0	1	$348	$0	$5,751	16.53	0.53
8380	VEH MNT SHOP ORG	MAU-8	16	30	0	0	20.5	0	0	$85	0	1	0	3	$813	$0	$806	0.99	9.62
8380	VEH MNT SHOP ORG	RAD-1	20	20	0	1,314	209.0	0	0	$916	1	0	1	2	$1,213	$0	$8,684	7.16	1.32
8380	VEH MNT SHOP ORG	RAD-2	20	20	0	1,314	209.0	0	0	$916	1	0	1	2	$1,213	$0	$8,684	7.16	1.32
8380	VEH MNT SHOP ORG	RAD-3	20	20	0	1,314	209.0	0	0	$916	1	0	1	2	$1,213	$0	$8,684	7.16	1.32
8380	VEH MNT SHOP ORG	RAD-4	20	20	0	1,314	209.0	0	0	$916	1	0	1	2	$1,213	$0	$8,684	7.16	1.32
8390	TAC EQUIP SHOP	AHU-1	15	18	5	33,838	80.4	0	0	$1,847	1	0	0	1	$348	$0	$16,434	47.22	0.19
8390	TAC EQUIP SHOP	AHU-1	15	27	0	2,322	38.9	0	0	$256	0	2	0	3	$1,097	$0	$2,369	2.16	4.28
8390	TAC EQUIP SHOP	AHU-1	15	33	0	27	1.7	0	0	$8	0	1	0	0	$272	$0	$77	0.28	33.17
8390	TAC EQUIP SHOP	AHU-1	15	36	0	792	0.0	0	0	$33	0	0	0	2	$399	$0	$287	0.72	12.19
8390	TAC EQUIP SHOP	BLR-1	1	1	0	40,485	0.0	0	0	$1,672	2	0	0	0	$277	$0	$14,681	53.00	0.17
8390	TAC EQUIP SHOP	BLR-1	1	2	0	0	18.4	0	0	$76	0	0	0	3	$836	$0	$724	0.87	11.01
8390	TAC EQUIP SHOP	BLR-1	1	4	0	0	0.0	4	0	$96	0	0	2	0	$330	$0	$819	2.48	3.44
8390	TAC EQUIP SHOP	CH-1	8	17	7	140	0.0	3	0	$249	1	0	1	0	$243	$0	$2,128	8.76	0.97
8390	TAC EQUIP SHOP	HV-1	16	18	0	4,743	151.5	0	0	$820	1	0	0	1	$348	$0	$7,667	22.03	0.42
8390	TAC EQUIP SHOP	HV-1	16	30	0	0	38.9	0	0	$160	0	1	0	3	$813	$0	$1,527	1.88	5.08
8390	TAC EQUIP SHOP	HV-1	16	33	0	0	8.8	0	0	$36	0	1	0	0	$272	$0	$345	1.27	7.51
8390	TAC EQUIP SHOP	MAU-1	16	18	0	4,743	0.0	0	0	$196	1	0	0	1	$348	$0	$1,720	4.94	1.78
8390	TAC EQUIP SHOP	MAU-1	16	30	0	0	69.8	0	0	$287	0	1	0	3	$813	$0	$2,739	3.37	2.83
8390	TAC EQUIP SHOP	MAU-2	16	18	0	4,743	0.0	0	0	$196	1	0	0	1	$348	$0	$1,720	4.94	1.78
8390	TAC EQUIP SHOP	MAU-2	16	30	0	0	69.8	0	0	$287	0	1	0	3	$813	$0	$2,739	3.37	2.83
8390	TAC EQUIP SHOP	RAD-1	27	25	0	0	0.0	3	0	$72	0	1	0	1	$456	$0	$614	1.35	6.33
8390	TAC EQUIP SHOP	UH-1	21	20	0	3,382	233.5	0	0	$1,102	1	0	1	2	$1,213	$0	$10,393	8.57	1.10
8390	TAC EQUIP SHOP	UH-2	21	20	0	3,382	233.5	0	0	$1,102	1	0	1	2	$1,213	$0	$10,393	8.57	1.10
8410	VEH MNT SHOP ORG	AHU-1	15	18	2	21,654	33.9	0	0	$1,097	1	0	0	1	$348	$0	$9,721	27.93	0.32
8410	VEH MNT SHOP ORG	AHU-1	15	27	0	1,072	9.5	0	0	$84	0	2	0	3	$1,097	$0	$763	0.70	13.13
8410	VEH MNT SHOP ORG	AHU-1	15	33	0	16	1.0	0	0	$5	0	1	0	0	$272	$0	$47	0.17	54.90
8410	VEH MNT SHOP ORG	AHU-1	15	36	0	366	0.0	0	0	$15	0	0	0	2	$399	$0	$133	0.33	26.42
8410	VEH MNT SHOP ORG	AHU-2	15	18	3	20,046	13.9	0	0	$965	1	0	0	1	$348	$0	$8,493	24.40	0.36
8410	VEH MNT SHOP ORG	AHU-2	15	27	0	776	4.8	0	0	$52	0	2	0	3	$1,097	$0	$468	0.43	21.23

[illegible]	[illegible]	[illegible]	SYS TYPE	[illegible] NUMBER	[illegible] SVGS. PER YR	KWH SVGS. PER YR	[illegible] SVGS PER YR	LABOR HOUR SVGS. PER YR	MATRL SAVGS. PER YR	COST SVGS. PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL CONSTR. COST	[illegible] PER YR	TOTAL DISC. SAVINGS	[illegible]	[illegible]
8410	VEH MNT SHOP ORG	AHU-2	15	33	0	6	0.4	0	0	$2	0	1	0	0	$272	$0	$17	0.06	151.69
8410	VEH MNT SHOP ORG	AHU-2	15	36	0	265	0.0	0	0	$11	0	0	0	2	$399	$0	$96	0.24	36.51
8410	VEH MNT SHOP ORG	AHU-3	15	18	2	21,654	33.9	0	0	$1,097	1	0	0	1	$348	$0	$9,721	27.93	0.32
8410	VEH MNT SHOP ORG	AHU-3	15	27	0	1,072	9.5	0	0	$84	0	2	0	3	$1,097	$0	$763	0.70	13.13
8410	VEH MNT SHOP ORG	AHU-3	15	33	0	16	1.0	0	0	$5	0	1	0	0	$272	$0	$47	0.17	54.90
8410	VEH MNT SHOP ORG	AHU-3	15	36	0	366	0.0	0	0	$15	0	0	0	2	$399	$0	$133	0.33	26.42
8410	VEH MNT SHOP ORG	AHU-4	15	18	2	22,575	35.5	0	0	$1,141	1	0	0	1	$348	$0	$10,116	29.07	0.30
8410	VEH MNT SHOP ORG	AHU-4	15	27	0	1,146	9.5	0	0	$87	0	2	0	3	$1,097	$0	$790	0.72	12.67
8410	VEH MNT SHOP ORG	AHU-4	15	33	0	18	1.1	0	0	$5	0	1	0	0	$272	$0	$50	0.18	51.35
8410	VEH MNT SHOP ORG	AHU-4	15	36	0	391	0.0	0	0	$16	0	0	0	2	$399	$0	$142	0.36	24.72
8410	VEH MNT SHOP ORG	AHU-5	15	18	2	22,762	23.9	0	0	$1,101	1	0	0	1	$348	$0	$9,727	27.95	0.32
8410	VEH MNT SHOP ORG	AHU-5	15	27	0	1,176	9.5	0	0	$88	0	2	0	3	$1,097	$0	$801	0.73	12.49
8410	VEH MNT SHOP ORG	AHU-5	15	33	0	9	0.6	0	0	$3	0	1	0	0	$272	$0	$26	0.09	100.03
8410	VEH MNT SHOP ORG	AHU-5	15	36	0	401	0.0	0	0	$17	0	0	0	2	$399	$0	$146	0.36	24.07
8410	VEH MNT SHOP ORG	AHU-6	15	18	21	70,986	201.3	0	0	$4,298	1	0	0	1	$348	$0	$38,224	109.84	0.08
8410	VEH MNT SHOP ORG	AHU-6	15	27	0	0	28.6	0	0	$118	0	2	0	3	$1,097	$0	$1,123	1.02	9.31
8410	VEH MNT SHOP ORG	AHU-6	15	33	0	0	7.7	0	0	$32	0	1	0	0	$272	$0	$304	1.12	8.54
8410	VEH MNT SHOP ORG	AHU-7	15	18	14	47,821	149.7	0	0	$2,953	1	0	0	1	$348	$0	$26,304	75.59	0.12
8410	VEH MNT SHOP ORG	AHU-7	15	27	0	0	62.0	0	0	$255	0	2	0	3	$1,097	$0	$2,433	2.22	4.30
8410	VEH MNT SHOP ORG	AHU-7	15	33	0	0	3.5	0	0	$14	0	1	0	0	$272	$0	$136	0.50	19.12
8410	VEH MNT SHOP ORG	CH-1	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
8410	VEH MNT SHOP ORG	CH-2	8	17	3	53	0.0	3	0	$138	1	0	1	0	$243	$0	$1,182	4.86	1.75
8410	VEH MNT SHOP ORG	CH-3	8	17	5	96	0.0	3	0	$194	1	0	1	0	$243	$0	$1,655	6.81	1.25
8410	VEH MNT SHOP ORG	CH-4	8	17	4	88	0.0	3	0	$183	1	0	1	0	$243	$0	$1,560	6.42	1.33
8410	VEH MNT SHOP ORG	CH-5	8	17	3	70	0.0	3	0	$161	1	0	1	0	$243	$0	$1,371	5.64	1.51
8410	VEH MNT SHOP ORG	MAU-1	16	18	0	23,360	0.0	0	0	$965	1	0	0	1	$348	$0	$8,471	24.34	0.36
8410	VEH MNT SHOP ORG	MAU-1	16	30	0	0	41.0	0	0	$169	0	1	0	3	$813	$0	$1,611	1.98	4.81
8410	VEH MNT SHOP ORG	MAU-2	16	18	0	23,360	0.0	0	0	$965	1	0	0	1	$348	$0	$8,471	24.34	0.36
8410	VEH MNT SHOP ORG	MAU-2	16	30	0	0	41.0	0	0	$169	0	1	0	3	$813	$0	$1,611	1.98	4.81
8410	VEH MNT SHOP ORG	MAU-3	16	18	0	9,829	0.0	0	0	$406	1	0	0	1	$348	$0	$3,564	10.24	0.86
8410	VEH MNT SHOP ORG	MAU-3	16	30	0	0	20.5	0	0	$85	0	1	0	3	$813	$0	$806	0.99	9.62
8410	VEH MNT SHOP ORG	MAU-4	16	18	0	9,829	0.0	0	0	$406	1	0	0	1	$348	$0	$3,564	10.24	0.86
8410	VEH MNT SHOP ORG	MAU-4	16	30	0	0	20.5	0	0	$85	0	1	0	3	$813	$0	$806	0.99	9.62
8410	VEH MNT SHOP ORG	MAU-5	16	18	0	23,360	0.0	0	0	$965	1	0	0	1	$348	$0	$8,471	24.34	0.36
8410	VEH MNT SHOP ORG	MAU-5	16	30	0	0	41.0	0	0	$169	0	1	0	3	$813	$0	$1,611	1.98	4.81
8410	VEH MNT SHOP ORG	MAU-6	16	18	0	23,360	0.0	0	0	$965	1	0	0	1	$348	$0	$8,471	24.34	0.36
8410	VEH MNT SHOP ORG	MAU-6	16	30	0	0	41.0	0	0	$169	0	1	0	3	$813	$0	$1,611	1.98	4.81
8410	VEH MNT SHOP ORG	MAU-7	16	18	0	15,860	0.0	0	0	$655	1	0	0	1	$348	$0	$5,751	16.53	0.53
8410	VEH MNT SHOP ORG	MAU-7	16	30	0	0	61.6	0	0	$254	0	1	0	3	$813	$0	$2,417	2.97	3.21
8410	VEH MNT SHOP ORG	MAU-8	16	18	0	15,860	0.0	0	0	$655	1	0	0	1	$348	$0	$5,751	16.53	0.53
8410	VEH MNT SHOP ORG	MAU-8	16	30	0	0	20.5	0	0	$85	0	1	0	3	$813	$0	$806	0.99	9.62

[illegible]	[illegible]	[illegible]	SYS TYPE	[illegible] NUMBER	[illegible] SVGS PER YR	KWH SVGS, PER YR	MBtu SVGS, PER YR	[illegible] HOUR SVGS, PER YR	MATRL SAVGS, PER YR	COST SVGS, PER YR	DO PNT	AO PNT	DI PNT	AI PNT	TOTAL CONSTR COST	[illegible] COSTS PER YR	[illegible] DISC SAVINGS	[illegible]	[illegible]
8410	VEH MNT SHOP ORG	RAD-1	20	20	0	1,314	209.0	0	0	$916	1	0	1	2	$1,213	$0	$8,684	7.16	1.32
8410	VEH MNT SHOP ORG	RAD-2	20	20	0	1,314	209.0	0	0	$916	1	0	1	2	$1,213	$0	$8,684	7.16	1.32
8410	VEH MNT SHOP ORG	RAD-3	20	20	0	1,314	209.0	0	0	$916	1	0	1	2	$1,213	$0	$8,684	7.16	1.32
8410	VEH MNT SHOP ORG	RAD-4	20	20	0	1,314	209.0	0	0	$916	1	0	1	2	$1,213	$0	$8,684	7.16	1.32